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RENNERFELT (E.). **Undersökningar över toxiciteten emot rötsvampar hos Tallkärnvedens fenoliska bestandsdelar.** [Investigations on the toxicity to rot fungi of the phenolic components of Pine heartwood.]—*Medd. Skogsförsöksanst., Stockh.*, 33, *1942–43*, pp. 331–364, 6 figs., 2 graphs, 1944. [German summary.]

Some of the data obtained in the writer's experiments on the fungicidal properties of pinosylvin and pinosylvin monomethylether, phenolic extractives of pine heartwood, including those relative to *Fomes annosus* [*R.A.M.*, xxiii, p. 464], have already been published [ibid., xxii, p. 282]; in the present paper the remaining information is summarized. *Lentinus squamosus*, *Polyporus marginatus*, and *Polystictus versicolor* succumbed to 0·02 per cent. pinosylvin, and *Coniophora cerebella*, [*C. puteana*], *Corticium laeve* [ibid., ix, p. 78], and *Trametes* [*F.*] *pini* to 0·01 per cent., whereas *Stereum purpureum* and *Polyporus vaporarius* [*Poria vaporaria*] exposed to 0·01 per cent. were still viable on transference to malt agar. At 0·02 per cent. pinosylvin monomethylether was toxic to *Polyporus marginatus* and *Poria vaporaria*, at 0·01 per cent. to *S. purpureum*, and at 0·002 per cent. to *Coniophora puteana*, whereas *Corticium laeve*, *F. annosus*, *L. squamosus*, *Polystictus hirsutus*, *P. versicolor*, *Schizophyllum commune*, and to a lesser degree *F. pini* were more resistant to this compound. Pinosylvin dimethylether was less toxic than either pinosylvin or its monomethylether, which were considerably more toxic than phenol.

The behaviour of *F. pini* in small-scale tests on impregnated pine heartwood blocks was anomalous, its growth under these conditions being practically unimpeded in contrast to its rapid collapse in the presence of the phenolic substances in pure culture.

ZVEREZOMB-ZUBOVSKY (E. V.) & MOROCHOVSKY (S. F.). Вредители и болезни Сахарной Свеклы в Башкирии и меры борьбы с ними. [Pests and diseases of Sugar Beet in Bashkiria and measures for their control.]—[*Publ.*] *Inst. bot. Acad. Sci. U.R.S.S.*, 39 pp., 22 figs., 1943.

The symptoms of some well-known diseases affecting sugar beets in Bashkiria, U.S.S.R., are described and recommendations made for their control. They include damping-off, leaf spot (*Cercospora beticola*), the 'propagation fungus' (*Moniliopsis aderholdi*), violet root rot (*Rhizoctonia violacea*) [*Helicobasidium purpureum*], 'tail' rot (*Bacillus betae* [regarded by Miss Elliott as non-pathogenic], *B. lacerans* [= *B. betae* fide Miss Elliott], and other bacteria), three forms of decay due to *Phoma betae*, on the foliage, stems, and seed-clusters, *Fusarium* root rot, downy mildew (*Peronospora schachtii*), mildew (*Erysiphe communis* f. *betae*) [*E. polygoni*], and rust (*Uromyces betae*).

BUCHHOLTZ (W. F.). **The sequence of infection of a seedling stand of Sugar Beets by Pythium debaryanum and Aphanomyces cochlioides.**—*Phytopathology*, xxxiv, 5, pp. 490–496, 1 fig., 3 graphs, 1944.

In an experimental study to determine the relative importance of *Pythium*

debaryanum [*R.A.M.*, xviii, p. 5] and *Aphanomyces cochlioides* [ibid., xxiii, p. 464] in the destruction of sugar beet seedling stands in the warm soils of northern Iowa, the former organism killed 33 per cent. of the plants grown from untreated American No. 1 seed in lightly infested soil, 90 per cent. in heavily infested, and 60 per cent. in soil occupied by the two fungi jointly. The seedlings attacked by *P. debaryanum* were nearly all dead a fortnight after planting. Only a small proportion of the seedlings arising from seed treated with new improved ceresan (5 oz. per 100 lb.) was killed by *P. debaryanum*.

Infection by *A. cochlioides* began when the work of *P. debaryanum* had been completed, about 15 days after planting, and by the 28th day nearly all the survivors, from both treated and untreated seed, were invaded by the former pathogen, which, unlike the latter, is not amenable to seed treatment.

MORRIS (H. E.). **Conditions favouring phosphate deficiency in Sugar Beets.**—Abs. in *Proc. Amer. Soc. Sug. Beet Tech., 1942*, p. 422, 1943.

Phosphate deficiency commonly develops in sugar beets following a two-year lucerne crop in heavy irrigated soils in Montana. Lucerne is a large feeder on phosphates, a four-ton crop of hay removing 40 lb. phosphorus (P_2O_5) without depleting the nitrogen content of the soil. When beets succeed lucerne, the ratio between available phosphorus and nitrogen is unbalanced, with the result that many young plants succumb to black root [*R.A.M.*, xxi, p. 278], while the survivors exhibit acute phosphate deficiency symptoms in July or August. Sugar beet may give a low yield in a poor soil and not develop phosphate deficiency symptoms because the ratio of nitrogen to phosphorus is balanced.

DAVIES (D. L. G.). **Infection of Pea seedlings with the Fusarium causing foot rot, and some environmental relations of the fungus.**—*Rep. agric. hort. Res. Sta., Bristol, 1943*, pp. 103–107, [1944].

Studies on the organism causing *Fusarium* foot rot of peas (*F. solani* var. *martii* f. 2) [*R.A.M.*, xxi, p. 245; xxii, p. 291] showed that no growth occurred at 0° and 32° C., while the optimum lay between 26° and 28°.

In experiments in a heated greenhouse, pea seeds were sown in pots filled with sterilized soil and inoculum (infected bran) mixed in the proportion of 10 to 1. Emergence was 40 per cent. in the inoculated pots, as against 96 per cent. in the controls. In a second test, one half of each of six boxes was filled with a compost consisting of inoculum and soil in the proportion of 1 to 15, and planted. In the other half, the inoculum was placed in one layer beneath seed-level and separated from the seeds by a layer of soil ¼ in. thick. The results showed that when the inoculum was mixed with the soil, emergence was 72 per cent., when the inoculum was at seed-level, it was 66·6 per cent., and in the uninoculated controls it was 90 per cent. After five weeks, the corresponding figures for surviving plants were 37, 0, and 90 per cent., respectively. Plants growing on the concentrated layer of inoculum showed total decay of the cotyledons and root systems with intense blackening of the region between the point of attachment of the cotyledons and soil-level. Plants in the soil with dispersed inoculum showed a uniform decay of the root systems and foot. When this experiment was repeated, the inoculum being placed in one layer above seed-level and separated from the seeds by a ½-in. layer of soil, the infected pots and the controls showed, respectively, 23·3 and 90 per cent. emergence. All the plants were severely rotted in the region of the epicotyl, which corresponded to the position of the inoculum, and in every instance infection had spread downwards to the cotyledons and roots.

When pea seeds were grown in infected soil in boxes with glass sides it was observed that infection occurred anywhere from the hypocotyl to soil-level. When

a larger proportion of inoculum was used, both radicles and plumules were immediately attacked.

In an experiment conducted out of doors in a wooden box containing inoculated soil, seedling attack was induced under conditions of high temperature.

Greenhouse tests demonstrated that the rate and severity of infection of pea seedlings were directly proportional to the amount of inoculum used. Susceptibility was not affected by soil acidity (P_H 2·75 to 8·75).

MOORE (W. C.). **Chocolate spot of Beans.**—*J. Minist. Agric.*, li, 6, pp. 266–269, 1944.

Chocolate spot (*Botrytis cinerea*) [*R.A.M.*, xxiii, p. 422] is the most serious disease of field and broad beans in England, but its importance has been exaggerated. Records show that during the past 28 years, serious epidemics have occurred over most of the country on five occasions; local epidemics, mostly in the south and west, developed in five other years; in 11 years incidence was normal; and in seven years the disease caused only slight damage.

In 1944, the upper portions of many of the main shoots of beans damaged by May frosts in East Anglia, Yorkshire, and elsewhere were later killed by chocolate spot and soon became covered with the spores of the fungus. The dead tops of these shoots provided a source from which *B. cinerea* could attack the lateral shoots produced lower down the stem to replace the dead main shoot. Winter injury and frost damage give rise to dead or weakened bean material on which a big reservoir of *B. cinerea* accumulates, but rainfall determines the severity of attack. Air temperatures of 60° to 68° F. are most favourable to the fungus, which spreads rapidly only when the weather is wet or very humid. The worst outbreaks occur when late frosts are followed by rains. It is suggested that the fungus may possibly be carried over with the seed.

Experimental evidence has shown that potash deficiency in the soil predisposes beans to attack [loc. cit.], even when the deficiency is not serious enough to produce visible symptoms in the crop. The disease tends to be worse in soils low in available phosphate [loc. cit.]. Spring-sown beans are seldom badly attacked [ibid., xxi, p. 62], while winter beans, sown in September or early October, are sometimes more seriously affected than those sown later. Conditions favouring moisture among the plants also favour the disease.

A soil dressing of $1\frac{1}{2}$ cwt. per acre of muriate of potash or an equivalent amount of potash in another form, such as 6 cwt. kainit per acre, will probably reduce the effects of the disease.

HOYMAN (W. G.). **Witches' broom of Beans.**—*Phytopathology*, xxxiv, 5, pp. 505–506, 1 fig., 1944.

Four bean plants in a Tucson (Arizona) allotment developed an abnormal condition in October, 1943, characterized by excessive multiplication of branches and resulting in typical witches' broom symptoms. The pods on the diseased parts were stunted and frequently wrinkled. One Lima bean [*Phaseolus lunatus*] plant in another allotment in the same town showed similar symptoms in November, the pods being $\frac{11}{16}$ to $1\frac{3}{16}$ in. in length compared with the normal $3\frac{11}{16}$ in., and some two-thirds being wrinkled.

ZAUMEYER (W. J.) & HARTER (L. L.). **A severe necrosis caused by Bean-mosaic virus 4 on Beans.**—*Phytopathology*, xxxiv, 5, pp. 510–511, 1 fig., 1944.

In addition to the two types of infection, local and systemic, already described as characteristic of bean mosaic virus 4 (*Marmor laesiofaciens*) [*R.A.M.*, xxiii, p. 204], a third form of reaction has recently been observed in a strain of the Blue Lake variety, the inoculated leaves of which developed a more or less extensive

necrotic spotting of the veins and veinlets. Ten to twelve days later, irregular, reddish, necrotic lesions appeared, generally on the upper side of one or more of the trifoliate leaflets, accompanied by reddening of the veinlets and drooping at the pulvini. Infection was frequently confined to one side of the midrib, resulting in the unilateral cessation of growth and consequent distortion. The stems and petioles of diseased plants showed a dark discoloration or deep reddish streaks and became slightly shrunken. A less common manifestation of the virus consists in growth failure or excessive rosetting, chlorosis, thickening, and brittleness of the trifoliate leaves, curtailment, shrinking, darkening, and brittleness of the internodes, and necrosis of the internal tissues. The death of such plants may be delayed for several weeks.

JENSEN (J. H.) & LIVINGSTON (J. E.). **Variation in symptoms produced by isolates of Phytomonas medicaginis var. phaseolicola.**—*Phytopathology*, xxxv, 5, pp. 471–480, 1 fig., 1944.

The writers' studies on the variations in symptoms developing on Red Kidney Beans inoculated through the leaves, stems, germinated seeds, or pods with 13 halo blight (*Phytomonas* [*Pseudomonas*] *medicaginis* var. *phaseolicola*) isolates from naturally infected field-grown beans were carried out at the Nebraska Agricultural Experiment Station [*R.A.M.*, xxi, p. 358]. The isolates fell into three main groups on the basis of their pathogenicity to the inoculated plants, viz.: (1) four virulent, producing either all halo or both halo and halo-less primary foliar lesions, typical pod spots and marked stunting, wilting, vein-clearing, and systemic infection, culminating in premature death; (2) mild, characterized by the formation of halo-less primary leaf lesions and a few small pod spots; and (3) five intermediate, usually producing mixed halo and halo-less primary foliar lesions, and representing a transitional stage of pathogenicity between the two extremes. Some of the isolates that produced only halo-less lesions at 28° C. gave rise to the typical halo form at 16° and 22°, while others produced exclusively halo-less lesions at all three temperatures. In direct inoculations by spraying suspensions of macerated tissue from typical halo lesions on young leaves typical halo lesions resulted, whereas suspensions from halo-less lesions caused halo-less lesions. Occasionally the lesions differed from the parent type, indicating that variants are constantly arising.

In all physiological culture tests the characteristics of the various isolates conformed to Burkholder's description [ibid., ix, p. 695].

BURKHOLDER (W. H.). **Xanthomonas vignicola sp. nov. pathogenic on Cowpeas and Beans.**—*Phytopathology*, xxxiv, 4, pp. 430–432, 1944.

A technical diagnosis is given of *Xanthomonas vignicola* n.sp., the agent of a stem canker of Chinese Red Cowpeas in Texas, which proved extremely virulent in inoculation experiments on Red Kidney Beans. It is a strictly aerobic, uniflagellate rod, 1 to 2·8 by 0·46 to 0·92 (average 1·76 to 0·7) μ in 48-hour cultures on beef extract-peptone agar at 27° C., Gram-negative, the colonies on this medium being filiform, glistening, primuline yellow, and butyrous, while on potato dextrose agar they are more luxuriant, mucoid, and pale yellow or colourless. Litmus milk is slowly peptonized and converted in six weeks into a brownish-purple syrup. The minimum, optimum, and maximum temperatures for growth are 6° to 9°, 27° to 30°, and 37°. Gelatine is rapidly liquefied, and hydrogen sulphide produced in tryptone broth, but nitrites are not formed. Ammonium dihydrogen phosphate serves as a source of nitrogen, while the following carbohydrates are slowly utilized, with acid formation: dextrose, galactose, lactose, maltose, sucrose, and raffinose. Starch is hydrolysed and a definite lipolytic action was detected on spirit-blue agar [*R.A.M.*, xxi, p. 517].

X. vignicola differs from the related *X. phaseoli* in various characters. For instance, in milk the former produces a solid curd that persists for some weeks before peptonization begins, whereas the latter clears the medium from the second day onwards without curd formation. *X. vignicola* assimilates mannitol, which is not utilized by *X. phaseoli*; the latter, on the other hand, derives energy from compounds unassimilable by the cowpea pathogen, viz., xylose, glycerol, succinic acid salts, and, to a slight extent, levulose. The temperature relations of *X. phaseoli* likewise differ from those given above for *X. vignicola*, growth being made at 6° but not at 36°. In conclusion, no infection was secured in inoculations with *X. vignicola* on lucerne, *Lespedeza*, and soy-bean, the hosts of three somewhat similar organisms, namely, *X. alfalfae*, *X. lespedezae*, and *X. phaseoli* var. *sojense*, respectively.

Hoffmaster (D. E.). **Bacterial canker of Cowpeas.**—*Phytopathology*, xxxiv, 4, pp. 439–441, 1 fig., 1944.

In 1942 and 1943, cowpeas in various parts of Oklahoma were attacked by *Bacterium* [*Pseudomonas*] *vignae*, which in the latter year was also observed in Arkansas and, according to A. A. Dunlop (*Plant Dis. Reptr*, xxvii, p. 274, 1943), in Texas. The stems of diseased plants bore prominent, swollen, cracked cankers situated at various points between ground-level and a height of 6 to 8 in. In one field of the Whippoorwill variety the crop was almost totally destroyed by the pathogen. Other susceptible varieties included Wood's Sumptuous, Columbia, and Early Red, while among those showing resistance or the capacity to escape infection may be mentioned Buff or Iron, Victor, Potomac or Calico, Speckled, Crowder, and Brown Crowder.

[This information is also presented in *Sth. Seedsm.*, vii, 2, pp. 16, 40–41, 1 fig., 1944.]

Hickman (C. J.). **Shanking of Onion and Shallot associated with species of Phytophthora.**—*Rep. Agric. hort. Res. Sta., Bristol, 1943*, pp. 100–102, 2 figs., [1944].

The information in this paper has already been noticed from another source [*R.A.M.*, xxiii, p. 86].

Brierley (P.) & Smith (F. F.). **The perennial Tree Onion a carrier of Onion yellow dwarf virus.**—*Phytopathology*, xxxiv, 5, pp. 506–507, 1944.

Experimental evidence is adduced for the transmission of the yellow dwarf virus from the perennial tree onion (*Allium cepa* var. *viviparum*) to commercial onions of the California Early Red variety by means of *Myzus persicae*, the former being a symptomless carrier of the disease. The multiplier onion (*A. c.* var. *solaninum*) was also shown to act as a conveyor of yellow dwarf to Early Reds, but in this case diagnostic symptoms are present. The tree onion is grown fairly extensively in New York State and elsewhere in the northern tier. Infective material of the multiplier was procured from West Virginia.

Walker (J. C.), Edmundson (W. C.), & Jones (H. A.). **Onion-set production.**—*Fmrs' Bull. U.S. Dep. Agric.* 1955, 21 pp., 18 figs., 1944.

This bulletin, which supersedes the sections on onion sets in *Fmrs' Bull. U.S. Dep. Agric.* 434, includes on p. 19 notes on diseases and their control, abbreviated from *Fmrs' Bull. U.S. Dep. Agric.* 1060, [1919]. Most northern soils are liable to become more or less infested by smut [*Urocystis cepulae*], which persists indefinitely in the soil [*R.A.M.*, xviii, p. 367]. Effective control may be obtained by running a stream of 40 per cent. formaldehyde into the furrow with the seed; a dosage of 1 pint in 8 gals. water at 100 gals. per acre is adequate for the purpose, but a rather

better average result may be expected to follow the use of twice as much of the solution at half strength.

White varieties are much more susceptible than yellow or red ones to smudge [*Colletotrichum circinans*] and neck rot [*Botrytis allii*, *B. byssoidea*, and *B. squamosa*], and particular attention should therefore be paid to the curing of white onions, if necessary by artificial means. *C. circinans* causes only minor shrinkage, but the *B.* spp., under favourable weather conditions, may rapidly destroy the bulk of the crop.

The yellow dwarf virus being perpetuated in bulbs or sets, as well as transmitted by aphids, set crops should be located at a minimum distance of 20 rods from a crop raised from sets or consisting of bulbs carried over from the previous year for seed production.

Massnahmen gegen die Salatfäule. [Measures against Lettuce rot.]—*Gärtn. Rdsch.*, *1943*, 41, 1943. [Reprinted in *Kranke Pflanze*, xxi, 1–2, pp. 14–15, 1944.]

The German lettuce crop is stated to have been severely reduced of recent years by bacterial (*Bacterium* [*Xanthomonas*] *lactucae* and *Bact. aptatum* [*Pseudomonas aptata*]) and fungal (*Sclerotinia sclerotiorum*) rots. Control measures should comprise the removal and burning of diseased material and soil sterilization, preferably in the autumn, with a 1 per cent. formalin solution, which should be sprinkled over the prospective sites of new beds at the rate of 5 l. per sq. in. and the treated area covered with straw matting or the like; planting should not be undertaken within two or three weeks at least. In the case of beds from which the soil is cleared away in the autumn, formalin should be applied by sprinkling at a dosage of 15 to 25 l. per cu. m., the soil being turned continuously during the treatment.

Ogilvie (L.). **Downy mildew of Lettuce. A preliminary note on some greenhouse experiments.**—*Rep. agric. hort. Res. Sta., Bristol, 1943*, pp. 90–94, [1944].

In further studies on lettuce downy mildew [*Bremia lactucae*: *R.A.M.*, xxi, p. 479] the author found infection on the leaves of groundsel (*Senecio vulgaris*) in all parts of the Bristol advisory province, in localities remote from any lettuce plantings, and at all times of the year. The presence of the fungus on this host in England has already been recorded by various writers; it has also been found in this country on sow-thistle (*Sonchus*) and on *Cirsium* sp., while in the Long Ashton plantations heavy infection has been observed on *Senecio vulgaris*, *Sonchus oleraceus*, and *C. arvense*. Jagger found that the strain occurring on lettuce near London in 1926 was distinct from that present on the Composite weeds [cf. ibid., xii, p. 417; xix, p. 577]. The author ascertained, in 1943, that the form occurring on these weeds at Long Ashton does not infect the Cheshunt Early Ball lettuce and, conversely, that two forms found in Somerset on the Cheshunt varieties will not infect *Senecio* or *Sonchus*. In the present instance, therefore, the presence of these infested weeds near the lettuce plantings did not constitute a danger.

The origin of the outbreaks on glasshouse lettuce at Long Ashton remains uncertain. The fungus may, probably, be carried over in the soil from one crop to another in the form of sporangia or oospores. Abundant oospores were found in the blackened parts of groundsel leaves, but oospores have not yet been observed by the writer in lettuce leaves. The disease occurs on outdoor lettuces practically throughout the year, and these may serve as a source of infection for indoor crops. A possible source of infection in badly managed greenhouses is debris reaching the water tanks. An infected leaf floating in water produced viable conidia for at least a fortnight.

The finding of Schultz that a saturated atmosphere was necessary for stomatal penetration by the germ-tubes [ibid., xvii, p. 289] and that of Schultz and Röder that the fungus was unable to fructify until the relative humidity reached 96 per

cent. [ibid., xviii, p. 8] were confirmed by the author, who was generally unable to obtain wholesale infection by spraying with a spore suspension in the open greenhouse or even in a large partitioned-off chamber of a small greenhouse. Satisfactory results were obtained, however, when the seed was sown in steam-sterilized soil in 6-in. pots, these placed on a layer of peat inside 10-in. pots, and the tops of the latter covered by glass, the seedlings being atomized with a spore-suspension of the fungus. In this way, practically complete infection of Cheshunt Early Ball seedlings was obtained, conidiophores being produced on the leaves in five to eight days. Seedlings sprayed while the cotyledons were still folded became heavily infected, and the plants remained capable of being infected until the leaves were at least 4 cm. long, but it was usually difficult to infect mature plants.

When fungicides were applied to the seedlings before spraying with the spore suspension, spraying with half-strength bouisol or with shirlan (1–300) or dusting with materials containing 17·5 per cent. copper gave up to 2 per cent. infection, while an application of ground sulphur gave 5 per cent. infection; the control pots showed over 90 per cent. mildew.

The strain of the fungus occurring on forced lettuces at Long Ashton severely attacked Cheshunt Early Ball, Newmarket (Trocadero), Sutton's Imperial (a Passion lettuce, grown out of doors in winter), and May King, whereas Gotte à forcer was very highly resistant. Golden Ball showed about 5 per cent. infection of seedlings, while Loos Tennisball and Early French Frame (and its Blackpool strain) were not attacked. The second strain of the fungus, obtained from greenhouses at Huntspill, Somerset, on Cheshunt Early Giant, infected equally severely Cheshunt Early Ball, Golden Ball, Gotte à forcer, Early French Frame (and its Blackpool strain), and Loos Tennisball.

It is tentatively suggested that where the disease gives trouble every year in cold houses or frames, trial should be made of one of the resistant varieties mentioned, in case the first strain is present. It is reported, for example, that Loos Tennisball is giving excellent results in Lancashire. If the Cheshunt varieties are grown, the seedlings should be raised in sterilized soil and treated with a copper fungicide or shirlan just after they appear above ground and, if thought necessary, just before transplanting. The houses in which the plants are put out should be watered before planting and, if possible, heated. If the plants become infected after being put out, the lower leaves should be removed, and the temperature raised to 60°–65° F. for at least one night. Watering should not be repeated unless the ground becomes so dry that the plants wilt. The disease can generally be kept under in frames if the lower leaves are removed.

HARTMAN (J. D.). **Results of spraying Watermelons with a copper fungicide.**—*Proc. Amer. Soc. hort. Sci.*, xlii, pp. 585–589, 1943.

After stating that watermelons in south-western Indiana are not sprayed for disease control, though defoliating diseases, particularly *Macrosporium* leaf spot [?*Pleospora herbarum*], are prevalent, the author describes a series of spraying tests carried out on the Hawkesbury variety in 1940–42. The spray consisted of 1·5 lb. of an insoluble copper fungicide (about 50 per cent. copper), 0·4 lb. of a commercial spreader-sticker, and 8 lb. wheat flour in 100 gals. water. In 1940, three applications were made at the rates of 90, 90, and 190 gals. per acre, while in 1941 the corresponding rates were all 170 gals. per acre, and in 1942 they were 320, 320, and 180 gals. per acre. The year 1940 was very dry, and leaf diseases were at no time extremely destructive. In 1941, there were 11 days with some precipitation in July, and by 10th August leaf diseases were very prevalent. In 1942, July was nearly as wet as it had been the year before, but leaf diseases developed more slowly.

In 1940, the sprayed plants gave a total yield of No. 1 quality fruits of 24,046 lb.

per acre, as against 23,030 lb. for the unsprayed. In 1941, the yield of No. 1 quality and marketable fruits amounted to 14,338 lb. per acre for the sprayed plants and 11,154 lb. for the unsprayed; while in 1942, the corresponding figures were 28,158 and 25,677 lb. Refractometer studies on the juice of ripe melons in 1941 showed that late in the season the quality of the sprayed fruits (refractive index 9·2) was far superior to that of the unsprayed (7·7).

The annual cost of the spraying is estimated at $10.50 to $12 per acre. With farm prices for melons at the usual level, spraying would have paid in the wet season of 1941, but not in 1940 or 1942, when slightly better financial returns might have been obtained from the unsprayed than from the sprayed plots. Taking the three years as a whole, spraying would have brought no profit, unless exceptionally high prices had obtained, or a premium had been paid for quality. Spraying, however, would be necessary in a watermelon business that demanded a dependable supply of quality fruit.

DUFRÉNOY (J.). **Some physiological relations of virus-infected plant tissues.**—*Biodynamica*, iv, 91, pp. 171–184, 1943.

This is a review of the literature on the development of the notions of (*a*) chlorophyll disintegration as correlated with enhanced oxidase activity in virus-diseased plants, and (*b*) cytochemical and cytophysiological relationships between virus nucleoproteins and chromoplast chromoproteins.

DARLINGTON (C. D.). **Heredity, development, and infection.**—*Nature, Lond.*, cliv, 3901, pp. 164–169, 3 figs., 1944.

The author concludes after a review of the evidence that proteins in the cytoplasm can now be put in a rough genetic classification. On the one hand, there are proteins put together by the nucleus with the help of desoxyribose nucleic acid. These need not be self-reproducing. On the other hand, there are other proteins, plasmagenes and viruses, formed in the cytoplasm only from pre-existing proteins of similar type. These nuclear types depend for their reproduction on ribose nucleic acid and are conditionally self-perpetuating. The plasmagene is a protein which can be made outside the nucleus and comes to be inherited through the egg. The virus is a similar protein which is capable of being acquired later. It is a protein which prospers through being in the wrong organism and gets there by infection. Both classes are very heterogeneous. In addition, both are considered to be continuously arising *de novo* and rapidly evolving on account of the high frequency of their mutations and the rapidity of their selection.

CARSON (G. P.), HOWARD (H. W.), MARKHAM (R.), & SMITH (K. M.). **Paracrinkle virus and inheritance.**—*Nature, Lond.*, cliv, 3906, p. 334, 1944.

Referring to Darlington's recent article [see preceding abstract], the authors interpret his comments on potato paracrinkle in relation to the protein of one plant genotype becoming a destructive agent in another as implying that a protein constituent of King Edward becomes a virus on transference by grafting to another potato variety. They state that whatever evidence there is does not support this view.

The virus of potato paracrinkle is not transmitted through the seed. Thus, 22 seedlings from the cross King Edward female × Flourball were grafted on Arran Victory, and in no case was the paracrinkle virus present in the seedlings. Paracrinkle, therefore, like most viruses and not like a plasmagene, can be transmitted by grafting to certain potato varieties that carry it without symptoms, e.g., President. From such infected President plants other susceptible varieties, such as Arran Victory, can also be infected in series. There appears to be no fundamental

difference between the reaction of King Edward to paracrinkle and that of any other 'carrier' variety to the virus carried.

HADDOW (A.). **Transformation of cells and viruses.**—*Nature, Lond.*, cliv, 3902, pp. 194–199, 1944.

This paper, concerned mainly with cancer research, includes a discussion on the origin and nature of plant viruses as interpreted by Darlington [see above].

Eighteenth Annual Report of the Department of Scientific and Industrial Research, New Zealand, 1943–1944.—57 pp., 1944.

In this report [cf. *R.A.M.*, xxiii, p. 4] it is stated that further information has been collected in New Zealand on the incidence of different fungi infecting house timbers. Discoloration of ceilings and walls was due mainly to *Cladosporium herbarum* and to a less extent to species of *Penicillium* and *Aspergillus*. These organisms were completely controlled by the addition of 2 per cent. of sodium pentachlorphenate [santobrite] to the glue size, casein distempers, and flour paste used.

Jonathan apples kept in refrigerated gas storage for 154 days in an atmosphere maintained at 8 per cent. carbon dioxide and 13 per cent. oxygen showed brown heart [ibid., xxi, p. 406] after two months, but the condition did not increase appreciably afterwards. The largest fruit showed 22 per cent. brown heart as against 5 per cent. for the smallest. Breakdown and fungal infection were beginning to appear at the final inspection. No Jonathan spot was present.

Sturmer apples were stored at 35°, 38°, and 41° F. in atmospheres containing varying percentages of carbon dioxide and oxygen. In general, the fruit held at 35° was severely affected by internal breakdown, while that kept at 41° developed severe superficial scald. No brown heart appeared in atmospheres containing 5 per cent. carbon dioxide with 16 or 10 per cent. oxygen.

Wrapping Granny Smith apples in oiled paper for three weeks at progressive stages of the storage life again demonstrated that the greatest protection against superficial scald occurred from the ninth to the twelfth weeks after commencement of storage. Fruit kept in oiled wraps during most of the storage period, but left unwrapped for three weeks at a time at progressive stages in its storage life again remained free from scald throughout the 24 weeks the experiment lasted. Core-flush [ibid., xviii, p. 187] was the only other disorder occurring during the commercial life of the fruit, and was unaffected by wrapping.

Granny Smith apples of two picks, stored in plain and oiled wraps, were subjected to delayed storage at weekly intervals up to six weeks. Core flush and the form of breakdown that arises from extension of core flush into the cortex were decreased by delay before storage in all except one sample. Fungal activity increased after four weeks' delay, after which, also, the colour of the fruit became excessively yellow. Thus, even apart from the question of scald, a delay of over four weeks between harvesting and storing could not be recommended. Oiled wraps delayed the first appearance and reduced the severity of scald.

In further studies on the effect of manurial treatments on the storage quality of apples, the complete PNK treatment gave fruit, in the case of Cox's Orange Pippin, as resistant to fungi and wilt as the untreated controls, and much more resistant to breakdown and storage pit. Fruit of this variety from nitrogen-treated trees was again outstanding for its high susceptibility to breakdown and fungal attack.

Jonathan apples grown on East Malling No. XII stock were much less subject to internal breakdown than when grown on Northern Spy or Malling types I or XV. Fruit on M I appeared to be rather less resistant than the others to ripe spot [*Neofabraea malicorticis*: ibid., xxiii, p. 5].

Three years' field experiments demonstrated that adequate control of apple ripe spot follows the use of Bordeaux mixture in January and February. Spray injury to the fruit may be reduced by increasing the quantity of hydrated lime or adding cottonseed oil. Applications of Bordeaux mixture to fruit after picking did not improve control and materially increased spray residues. When kept in cool storage, the sprayed fruits showed marked freedom from *N. malicorticis* and soft rots. Spraying in late summer controlled black spot [scab: *Venturia inequalis*] in cool storage.

In field tests made to ascertain the possibility of reducing apricot brown rot [*Sclerotinia fructicola*: ibid., xxi, p. 123], shirlan AG gave a high degree of control under severe test conditions, whereas sulphur was ineffective and caused fruit blemish. Substantial control of plum bacterial spot [*Xanthomonas pruni*: ibid., xxi, p. 2] was secured by spraying with Bordeaux mixture, though some spray injury resulted.

Further tests of the resistance of some 83 lines of beans to bacterial wilt [*Pseudomonas medicaginis*], anthracnose [*Colletotrichum lindemuthianum*], and mosaic [ibid., xxiii, p. 284] confirmed earlier results, showing that runner varieties are resistant to all three diseases, that the Burnley selections of Canadian Wonder and Dun French beans are highly resistant to *P. medicaginis* and mosaic, though the former is susceptible to *C. lindemuthianum*, that white-seeded varieties are highly resistant to *P. medicaginis*, and that Black Prince, Blue Pod, Wood's Centenary, Dun, and Zulu King are moderately resistant to all three diseases.

A survey of flax crops in four areas showed browning (*Polyspora lini*) present in only one crop, though in previous seasons it had been widely distributed. A species of *Phoma* was isolated from three crops, associated with a canker near the base of the stem. Rust (*Melampsora lini*) was present in all crops to a slight extent, but caused moderate or severe infection only in a few late-sown ones; it was common on the introduced *Linum marginale*.

More seed of the Vetomold tomato, which is resistant to leaf mould (*Cladosporium fulvum*), was distributed to growers. In some localities, individual plants of this variety have been found to be infected, indicating that a strain of the fungus to which Vetomold is not resistant has appeared. Efforts are in progress to produce F_2 plants resistant to both strains, and also to develop a resistant dwarf variety.

The presence of the fig mosaic virus [ibid., xx, p. 542] was demonstrated, this being a new record for New Zealand. Passion fruit grease spot [*Phytomonas passiflorae*: ibid., xviii, p. 235] was controlled by autumn spraying with Bordeaux mixture (3–4–50), provided the vines were pruned and trained on wires. Applications of Bordeaux mixture and cuprox materially reduced infection by ring spot (*Marssonina panattoniana*) [ibid., xx, pp. 102, 191] on winter-grown lettuces and considerably increased yields. Concentrated Bordeaux sprays did not prevent onion downy mildew [*Peronospora destructor*] from spreading from the sprayed to unsprayed plots, but increased yields by 18 per cent. over the latter. Cuprox was again superior to Bordeaux mixture against tomato late blight [*Phytophthora infestans*]; it was much less injurious to the plants, with the result that yields were increased, and it also gave adequate control of the disease. Of five lines of swede seed grown in New Zealand only one showed the presence of *Phoma lingam*, and then infection amounted to only 0·1 per cent.

Officers of the Tobacco Research Station and the Cawthron Institute co-operated in an investigation of tobacco mosaic. In the seedling bed the application of milk sprays conferred significant protection against virus infection through wounds, but when the leaves were not bruised the use of a virus spray did not result in heavy mosaic. Both tannin and milk sprays in tests in another locality significantly reduced mosaic in seedling beds where the plants had previously

been inoculated with the virus. The virus can persist in infected soil at least four months after the incorporation of infected tobacco trash. Weed transmission appears to be likely only in the case of *Solanum nigrum*.

Black root rot [*Thielaviopsis basicola*] was isolated for the first time during the period under review from stunted tobacco plants taken from a commercial field at Dovedale. Three more cases of infection were identified at Umukuri and Motueka. Angular leaf spot [*Pseudomonas angulata*] was identified in both living and cured tobacco leaves, and all the strains isolated gave positive results when inoculated into tobacco plants. Heavy rain may cause distribution of the bacteria, with resultant coalescence of the spots and considerable damage to the leaf. One case of tobacco *Verticillium* wilt [*V. albo-atrum*: ibid., xiv, p. 200], was found.

New records other than those mentioned above include *Entyloma calendulae* on marigold [*Calendula officinalis*], *Cylindrosporium concentricum* on cauliflower, *Ramularia primulae* on *Polyanthus*, and *Bacterium* [*X.*] *pruni* on peach.

Plant diseases. Notes contributed by the Biological Branch. - *Agric. Gaz. N.S.W.*, lv, 8, pp. 331–335, 6 figs., 1944.

Bacterial canker [*Corynebacterium michiganense*: *R.A.M.*, xxiii, pp. 193, 219] has been present for about ten years in the commercial tomato-growing areas of New South Wales, but it did not assume the importance of a major disease until 1943. In 1944, owing to the presence of the disease in seed crops on Lord Howe Island and the importation of infected seed from this locality and, possibly, from other States, heavy and general losses were sustained. Fruit symptoms are seldom seen except after wet weather or where spray irrigation is used. The spots are small, round, flat, snow-white, the centres becoming raised, tan-coloured, and rough, while the halo remains white and flat. Bacterial spot [*Xanthomonas vesicatoria*: ibid., xix, p. 518] is both less serious and less widespread. Almost all the tomato seed to be distributed in New South Wales in the coming season has been treated by the acetic acid steep [ibid., xxi, p. 353: xxiii, p. 219]. During the past season, this has proved remarkably effective against canker: it should also eliminate spot.

Stone fruit freckle (*Cladosporium carpophilum*) [ibid., xx, p. 558] is commonest in the coastal areas, particularly affecting mid-season and late peaches and nectarines. Control on these hosts consists in spraying with Bordeaux mixture (6–4–40) or lime-sulphur (1 gal. per 20 gals. water) at late bud-swell, and with lime-sulphur (1 gal. per 160 gals.) during the first week of October, three or four weeks later, and (except in the case of mid-season varieties) eight or nine weeks before harvest. Colloidal sulphur 1 to 2 lb. or wettable sulphur 5 lb. per 100 gals. may be used instead of the lime-sulphur in the second, third, and fourth applications. A spreader should be employed at all stages. With badly affected trees, the first season's adoption of spraying can be supplemented by hard pruning. After three consecutive seasons' spraying, the programme can be discontinued. On apricots, control usually follows spraying with Bordeaux mixture (6–4–40) in the early spring, at the red-bud stage. Sulphur sprays should not be applied to coastal varieties of apricots.

The paper concludes with recommendations for the control of tomato diseases.

Muñoz (F.). **Hongos chilenos no mencionados anteriormente en la literatura.** [Chilean fungi not previously mentioned in the literature.] — *Bol. Sanid. veg. Chile*, iii, 1, pp. 33–35, 1943.

A list is given of the fungi not previously recorded in the relevant literature on 41 hosts in Chile, of which the following may be mentioned: *Ustilago perennans* on *Avena elatior*, *Puccinia coronata* and *P. rubigo-vera* on *A. fatua*, *Ophiobolus graminis* on wheat, *Erysiphe graminis* on oats and barley, *Neocosmospora vasinfecta* on watermelon and *Cucurbita maxima*, *Uromyces caryophyllinus* on carnation,

Ascochyta pisi on lentils and broad beans, *Myxosporium corticola* on apple, *Taphrina cerasi* on cherry, *P. pruni-spinosae* on plum, *Fusarium sambucinum* and *Verticillium lateritium* [*Acrostalagmus cinnabarinus*] on potato, and *Sclerotinia minor* on red clover.

Principales enfermedades de origen parasitario que fueron objeto de consulta en el semestre Enero–Junio de 1943. [The principal diseases of parasitic origin which were the object of consultation during the half-year January to June, 1943.]—*Bol. Sanid. veg. Chile*, iii, 1, pp. 38–39, 1943.

The following parasitic diseases, besides those already reported, engaged the attention of the phytopathological staff of the Chilean Ministry of Agriculture during the period under review [cf. *R.A.M.*, xxiii, p. 254]: *Alternaria solani* on tomato, *Ascochyta syringae* on lilac, *Botryosphaeria ribis* on lemon [cf. ibid., xxi, p. 524], *Cercospora beticola* on beet, *Cintractia sorghi* on *Holcus sorghum* var. *technicus* [*Sorghum bicolor* var. *technicus*], *Puccinia sorghi* on sorghum, *P. menthae* on peppermint, and *Uromyces phascoli* [*U. appendiculatus*] on beans.

Diachun (S.) & Valleau (W. D.). **Growth and overwintering of plant pathogenic bacteria on wheat roots.** Abs. in *J. Bact.*, xlviii, 1, pp. 122–123, 1944.

Xanthomonas vesicatoria, *X. phaseoli* var. *sojense*, and *Bacterium* [*Pseudomonas*] *medicaginis* var. *phaseolicola* grew and formed colonies on the surface of wheat roots, and less freely on those of beans and soy-beans, under aseptic conditions. *X. vesicatoria* was recovered in five trials between 13th December, 1943, and 14th March, 1944, from the roots of wheat plants growing outdoors in unsterilized soil inoculated with the pathogen on the previous 10th November. Isolation was effected by washing the roots in running water, crushing them in water, and pouring the resultant suspension on the lower surface of tomato leaves, the development of spots on which indicated the presence of the bacterium.

White (N. H.). **The generic names of bacterial plant pathogens.**—*J. Aust. Inst. agric. Sci.*, x, 2, pp. 78–79, 1944.

The author follows Dowson [*R.A.M.*, xxii, p. 345] in adopting the generic names *Corynebacterium* Lehmann & Neumann, *Bacterium* Ehrenberg emend. Dowson, *Pseudomonas* Migula emend. Dowson, and *Xanthomonas* Dowson, and rejecting *Erwinia*. A key to these accepted genera is provided.

Pichler (F.). **Nassbeizverfahren mit Trockenbeizmitteln.** [The use of dusts in liquid methods of disinfection.]—*Z. PflKrankh.*, liii, 8–12, pp. 286–288, 1943.

At the Vienna branch of the Biological Institute, the writer carried out experiments to determine the possibility of utilizing a single cereal seed-grain disinfectant, either as a dust or by the immersion, sprinkling, or short-liquid processes. Such a combination would be a great advantage, not only by reason of the resultant simplification of the preparation and sale of the fungicide, but also to the purchaser, who can then apply it by any method that circumstances may dictate at the time of treatment. For this purpose four dusts (designated by the numbers I to IV) were compared with three preparations, viz., two liquids (A & B) and a dust (C), all except the last-named, which was used exclusively in the dry state, being applied by the four above-mentioned procedures. The amounts of the fungicides used for the liquid treatments uniformly corresponded with those prescribed for the dusting of the particular cereal concerned, irrespective of the volume of water required in each case, i.e., for 100 kg. wheat or barley 200 gm. and for 100 kg. oats 300 gm. The volumes of water necessary for the treatment of 100 kg. wheat by immersion, sprinkling, and short-liquid were 100, 10, and 3 l.,

respectively, the corresponding quantities for barley being 120 to 150, 12, and 3 l., respectively, and for oats 150 to 180, 15, and 4 l., respectively.

In general, the control of barley stripe [*Helminthosporium gramineum*], loose smut of oats [*Ustilago avenae*], and wheat bunt [*Tilletia caries* and *T. foetida*] by dusts in liquid form were quite satisfactory, only No. 1 permitting the development of more than a trace, whereas the controls were heavily infected. These results encourage hopes for the commercial development of a seed-grain disinfectant applicable by any of the current modes of treatment.

Suneson (C. A.). **Year-around occurrence of stem rust of Wheat (Puccinia graminis tritici) in California.**—*Plant Dis. Reptr*, xxviii. 11, pp. 410–413. 1944. [Mimeographed.]

Observations since early in 1941 indicate that wheat stem [black] rust (*Puccinia graminis tritici*) overwinters at Davis, California, and is present there through the other seasons of the year [cf. *R.A.M.*, xix, p. 463]. At all times, the infection centres are invariably discernible for two or three generations, notwithstanding appreciable wind movement. This localization introduces a serious problem in yield nurseries where spread is conditioned exclusively by inoculum from the vicinity. For instance, of the three crops, 1941, 1942, and 1943, only that of the first year was exposed to spore showers from a general epidemic that was first reported in Lower California, Mexico, in February, spread into the Imperial Valley in March, and thence northwards in California and eastwards into Arizona, until in July rust was generally distributed over the sparse wheat fields of Nevada. Even in that year, however, the evidence of infection in the nurseries at Davis was far from uniform, and in 1943 late varieties north of the original rust focus on the susceptible Ramona were severely damaged during the last fortnight of May, whereas those to the south were practically uninjured. A collection made on 18th April of that year was identified as race 56 of *P. g. tritici*.

Holton (C. S.). **Inheritance of chlamydospore and sorus characters in species and race hybrids of Tilletia caries and T. foetida.**—*Phytopathology*, xxxiv, 6, pp. 586–592, 2 figs., 1944.

In eight out of 32 hybrids between *Tilletia caries* and *T. foetida* [*R.A.M.*, xxii, p. 200], the smooth character of the chlamydospores of the latter species was completely dominant over the reticulate markings typical of the former, while in the remaining 24 the factor governing the development of reticulations partially predominated over that conferring smoothness. Variability in the reticulation type and spore dimensions was observed in the F_1 of some of the 23 hybrids between seven physiologic races within the two species (including dwarf wheat bunt) [ibid., xx, p. 158; xxi, p. 284].

Segregation and recombination of factors for chlamydospore characters occurred in the F_2 of the interspecific and interracial hybrids. This generation ordinarily comprised spores resembling both parents and different from both, but in one interspecific cross none of the smooth-type spores of *T. foetida* were represented in the progeny.

Certain differences between the sori of crosses between races T-9 and L-8 and those of the parents, notably the smaller dimensions of the former, are interpreted as indicative of genetic control of the sorus characters.

Vogel (O. A.), Classen (C. E.), & Gaines (E. F.). **The inheritance of reaction of Turkey–Florence 1 × Oro–1 to race 11 of Tilletia tritici.**—*J. Amer. Soc. Agron.*, xxxvi, 6, pp. 473–479, 1944.

Three crosses, consisting of the three possible combinations of Oro 1, Turkey–Florence 1, and Selection 9 of Turkey–Florence, were studied at the Washington

Agricultural Experiment Station for their reaction to race 11 of *Tilletia tritici* [*T. caries*: cf. *R.A.M.*, xxi, p. 519]. The F_1, F_2, and F_3 generations of all three crosses and six F_4 families of Turkey–Florence–1 × Oro–1, selected at random, were tested during 1940 under identical environmental conditions, and a further five F_4 families in 1941.

At least three factors, two major and one minor, appeared to be concerned in the segregation of reaction of Turkey–Florence–1 × Oro–1, the latter (more resistant) parent carrying the two major dominant factors and the former the one minor dominant. The mode of segregation of the crosses of Selection 9 with Oro–1 and Turkey–Florence–1 indicates that the first-named carries one of the two major factors of Oro–1 and the minor factor of Turkey–Florence–1. Three of the arbitrarily selected 11 F_4 families appeared to be derived from homozygous genotypes, one resembling Oro–1, the second Turkey–Florence–1, and the third combining all three factors of the two parents. Each of seven F_4 families seemed to proceed from a different heterozygous genotype, one segregating for three factors, three for two, and one for one factor. One F_4 family was evidently derived either from a genotype segregating for one factor or from a mixture of two genotypes, each segregating for one factor.

The presence of the new race, T–13, in the T–11 inoculum [ibid., xxi, p. 329] did not modify the so-called T–11 responses in a noticeable manner.

Merritt (P. P.) & Ausemus (E. R.). **Effect of scab on the quality of hard red spring Wheat.**—*Cereal Chem.*, xxi, 3, pp. 199–209, 1 graph, 1944.

The effect of scab (*Gibberella zeae*) on the physical and chemical properties, milling, and baking value of four hard red spring wheats, Thatcher, Regent, Ns. 2829, and Ns. 2822, was studied in Minnesota, where the disease constituted a serious problem in 1941 and 1942. Infection was shown appreciably to lower the test weight (by 6 lb. per bush.) and weight per 1,000 kernels (by 7·9 gm.), and to reduce the apparent specific gravity of the kernels, while there was also a slight but significant decrease in the flour yield of diseased samples. The ash and reducing sugar contents of the flours milled from the scabby wheats were somewhat, and the carotinoid pigment content considerably higher than those of the corresponding products from sound samples. Various undesirable characteristics of the dough made with flour from infected wheats (wet, sticky surfaces, tendency to collapse, production of bread with an unduly dark crust and a dull yellow crumb, and so forth), could be greatly minimized by blending with flour from healthy material. Even when the blends contained 30 per cent. 'scabby' flour, the handling properties of the dough were normal and the resultant loaf presented a reasonably attractive appearance, besides comparing favourably in value with the product of sound material.

Bell (G. D. H.). **Ear tipping in Wheat.**—*J. Minist. Agric.*, li, 7, pp. 318–319, 2 figs., 1944.

Wheat in the Cambridge area this year has shown a condition marked by white, shrivelled tips and upper parts of the ears. The proportion of the ear affected varies widely with different crops and also within the same field, but all cases show dead spikelets with no grain developing.

Examination of small plots of single plant selections from a Continental winter wheat showed that the condition did not occur in some selections, slightly affected others, and in two or three caused such severe damage that more than half the ear was white and shrivelled. The unaffected plants were those which had shown early ear emergence. Plants in the centre of each plot, where growth was poorest, were much more severely affected than the better-grown border plants. In most cases, the plants with the most severely affected ears were poorly grown and much

shorter in the straw than those with undamaged ears. On some plants the earliest ears were unaffected while the back tillers showed damaged ears. It was also noted that only that part of the ear that was exposed above the leaf sheath was damaged.

It is concluded that the condition was probably due to cold weather during flower development. Dry conditions accompanying the cold probably aggravated the damage.

Bretz (T. W.). **Wheat mosaic survey in Illinois and Missouri, and notes on other Wheat diseases.**—*Plant Dis. Reptr.* xxviii, 12, pp. 418–419, 1944. [Mimeographed.]

An inspection of some 90 Illinois wheat fields during the week ending 29th April, 1944, revealed an incidence of about 38 per cent. mosaic, which it was estimated would reduce the harvest by 50 per cent. or so. The symptoms of the disease were generally inconspicuous, but in a few instances of severe infection the yellowing and stunting of the plants were apparent from a distance. During the following week, the same disease was observed in a mild form in several counties of Missouri, from which State it had not previously been reported. Speckled leaf blotch (*Septoria tritici*) was prevalent in both States.

Chester (K. S.). **A cause of 'physiological leaf spot' of cereals.**—*Plant Dis. Reptr*, xxviii, 15, pp. 497–499, 1944. [Mimeographed.]

Physiological leaf spot, not associated with pathogenic organisms, though saprophytic bacteria, *Alternaria* spp., and other weed fungi may be found in older lesions, is characteristic of certain cereal varieties. Examples include the leaf-spotting of Chiefkan wheat, the surest means of distinguishing this variety from Red Chief, and that on Kareela oats, commonly known as 'Kareela spot' because it is so characteristic of this variety.

When 80 hybrid lines of wheat developed for resistance to leaf rust [*Puccinia triticina*] were being subjected to a relative humidity of 100 per cent. at 65° F. for 12 hours every night, it was found that every morning the leaves of many of them were stippled with numerous small, translucent, water-soaked lesions, which in most cases disappeared half-an-hour after the canvas cover was removed, the leaves regaining their normal appearance. In a few hybrids, however, recovery did not take place. The lesions persisted, the cells in them dying and giving rise to small, necrotic lesions in place of the water-soaked ones. No organism was found in the necrotic lesions which exactly resembled physiological leaf spot as seen in the field. Meantime, the same 80 hybrids were being grown in the field, and when these were examined after rain, physiological leaf spot was found on, and only on, the same few hybrids in which water-soaking in the greenhouse had been followed by necrotic breakdown of the tissues.

It is concluded that some wheat strains are, owing to physiological factors, unable to recover without injury from water-soaking due to high humidity. This inherited fault is, in some cases at least, the cause of physiological leaf spot.

Shands (H. L.) & Arny (D. C.). **Stripe reaction of spring Barley varieties.**—*Phytopathology*, xxxiv, 6, pp. 572–585, 1944.

The writers describe the methods and discuss and tabulate the results of their eight years' tests at the Wisconsin Agricultural Experimental Station on the reaction to stripe (*Helminthosporium gramineum*) of 375 spring barley varieties and selections [*R.A.M.*, xiii, p. 155], the germinating kernels of which were inoculated with mycelial suspensions from autoclaved wheat (15 gm.) and water (15 c.c.) cultures.

The incidence of infection in the Oderbrucker (C.I. 4666) variety, used as a check

in 91 inoculations, amounted to 75 per cent. and 12 varieties contracted upwards of 90 per cent., whereas 31 showed no infection. From the plant-breeding standpoint, however, interest centres on the 52 resistant varieties with less than 15 per cent. stripe, which included Korsbyg, White Gatami (C.I. 918), Trebi (C.I. 920), Chevron (C.I. 936), also resistant to stem rust [*Puccinia graminis*], mildew [*Erysiphe graminis hordei*], and scab [*Gibberella zeae*: ibid., xviii, p. 388], Cross (C.I. 1613 and C.I. 2492), Chinese Black (C.I. 1969), Gatami (C.I. 2276), Dorsett (C.I. 4821), Wisconsin Barbless (C.I. 5105), and Cebada 97 A (C.I. 6352).

Shear (G. M.) & Wingard (S. A.). **Some ways by which nutrition may affect severity of disease in plants.**—*Phytopathology*, xxxiv, 6, pp. 603–605, 1944.

The writers and others have obtained experimental evidence of a relationship between certain unbalanced conditions in the mineral nutrition of a host plant and the virulence of infection by vascular pathogens, and in this connexion attention is specially directed to McNew and Spencer's studies on the effect of nitrogen on the bacterial wilt of maize *Xanthomonas stewarti*: *R.A.M.*, xix, p. 208]. The information at hand appears to indicate that the observed increase in the severity of the disease in potassium-deficient seedlings is due to an accelerated rate of bacterial multiplication resulting from the increase in nitrate nitrogen in the conductive tissue, which in turn is consequent on the shortage of potassium. Assuming this interpretation to be correct, if the severity of attack by a pathogenic organism is accentuated by the application of an excess of nitrogenous fertilizer, but not by a deficiency of potassium, the inference is that the parasite is unable directly to utilize the nitrate nitrogen within the host. There is also a possibility that similar effects may be induced by the succulence of the host tissues, or more probably by the presence, in excessive quantities, of some complex nitrogen compound essential to the growth of the pathogen.

Harris (M. R.). **A study of fungi parasitic on Ohio seed Corn.**—*Plant Dis. Reptr*, xxviii, 9, p. 329, 1944. [Mimeographed.]

The tabulated results of germination tests carried out in 1943–4 by the Ohio Seed Improvement Association on a large number of maize samples, mostly of the 1943 crop but also comprising some material of 1942 and earlier, reveal a generally low incidence of the pathogenic fungi, *Aspergillus* sp., *Nigrospora sphaerica*, *Diplodia zeae*, *Fusarium moniliforme* [*Gibberella fujikuroi*], *G. zeae*, and *Penicillium* sp. The last-named species was the most prevalent, occurring on 1·49 per cent. of 75 small lots of 1943 hybrid seed maize, 1·07 per cent. of 84 similar lots of 1942 and earlier material, and 3·03 per cent. of 117 lots of inbred and single-cross seed.

Pady (S. M.). **The distribution of Milo disease in central and western Kansas as determined by soil samples.**—*Plant Dis. Reptr*, xxviii, 10, pp. 356–358, 1 map, 1944. [Mimeographed.]

The examination of 52 soil samples collected from sorghum fields in 37 counties of central and western Kansas between 20th September and 1st October, 1943, revealed the presence of milo disease (*Pythium arrhenomanes* and other factors) [*R.A.M.*, xxiii, p. 101] in 33, making a total, with the two eastern counties known to be infested, of 35 for the State.

Uppal (R. N.) & Patel (M. K.). **Long smut of Sorghum purpureo-sericeum.**—*Indian J. agric. Sci.*, xiii, 5, pp. 520–521, 1 pl., 1943.

Tolyposporium ehrenbergii var. *grandiglobum* n.var., common on the wild grass *Sorghum purpureo-sericeum* at Khadesh, Bombay Province, differs from *T. ehrenbergii* [*R.A.M.*, xix, p. 331] in the larger dimensions of its spore balls (45

to 239·9, mean 106·7 μ in diameter compared with 30 to 119·9, mean 67·5 μ) and the greater numbers of spores in each ball (exceeding as against less than 50).

Yu (T. F.). **Inheritance of kernel smut resistance in Millet crosses.** *Sci. Rec., Chungking*, 1, 1–2, pp. 248–250, 1942. [Received July, 1944.]

A study was carried out at the University of Nanking on the correlation between reaction to kernel smut (*Ustilago crameri*) and seed-coat colour in the parents and progenies of five millet [*Setaria italica*] crosses, viz., N2 × N65, N18 × N65, N36 × N65, N18 × N84, and N36 × N84, of which N2, N18, and N36 were resistant and N65 and N84 susceptible to the disease [*R.A.M.*, xvi, p. 741]. The seed coat colour of the three resistant parents was buff and that of the two susceptible red. The crosses were made in 1934 and the F_1 progeny were back crossed with their respective resistant parents in the following year. The F_2 seed, taken at random from F_1 plants, was heavily inoculated with smut spores and sown at a spacing of 4 in. in rod rows of 1 ft. apart.

Classing all plants that exhibited any degree of infection as susceptible and those showing none as resistant, 245 out of a total of 317 would fall into the latter. A calculation of this result on a 3 : 1 ratio basis gave a p value of 0·41. In back crosses of the F_1 offspring with N2, 396 plants segregated into 215 resistant and 181 susceptible, a computation of which on a 1 : 1 ratio basis yielded a p value of 0·089. An arbitrary sampling of 127 resistant plants produced 45 F_2 families homozygous and 82 heterozygous for resistance, the expected numbers in each class being 42·33 and 84·67, respectively. Five of the heterozygous lines segregated into resistant and susceptible plants in the following ratios: 141 : 45, 137 : 39, 142 : 54, 139 : 47, and 130 : 28, giving a total of 629 resistant and 213 susceptible, compared with expectations of 678·57 and 226·25, respectively. The result approximated a 3 : 1 ratio, with a p value of 0·27, indicating that resistance to *U. crameri* is dominant and governed by a single factor difference in N2 × N65.

The seed-coat colour of the same cross segregated in the F_2 into 242 varying shades of buff and 75 red plants, again in a ratio of roughly 3 : 1. The reaction to kernel smut was studied in four F_2 groups, namely, buff seed coat resistant, ditto susceptible, red seed coat resistant, and ditto susceptible. There were 185 buff resistant plants, 57 buff susceptible, 60 red resistant, and 15 red susceptible, denoting the absence of linkage between the factors for seed coat colour and smut reaction.

Stevenson (J. A.) & Johnson (A. G.). **The nomenclature of the Broomcorn Millet smut fungus.** *Phytopathology*, xxxiv, 6, p. 613, 1944.

Adherence to the International Rules of Botanical Nomenclature in the publications of the United States Department of Agriculture involves changes in a number of fungus names in common use, notably those applied to the cereal smuts. Only in one instance, however, has it been deemed necessary to adopt a new binary name, and that is for the smut of *Panicum miliaceum* ordinarily known as *Sphacelotheca panici-miliacei* (Pers.) Bub. The smut was originally listed by Persoon in 1801 as *Uredo segetum* subsp. *panici miliacei*, but under the provisions of section II, article 58, of the Rules, the first legitimate specific epithet is *destruens*, applied by Schlechtendahl in 1824 to *Caoma*. No previous transference of the latter genus to *Sphacelotheca* having apparently been made, *S. panici miliacei* accordingly becomes *S. destruens* (Schlecht). comb. nov.; a list of its eight synonyms is given.

Garcia (A.). **Gomosis esclerotiniosa en los Citrus.** [Sclerotinious gummosis in Citrus.]—*Bol. Sanid. veg. Chile*, iii, 1, pp. 31–32, 1943.

Sclerotinia sclerotiorum was ascertained to be the agent of citrus gummosis in the province of Santiago, Chile, where the first determination was made on lemons

on 20th August, 1940. The incidence of the disease is estimated at 5 per cent. Infection originates at the tips of the buds and in the flowers, and proceeds under favourable climatic conditions, viz., low or moderate temperature, high atmospheric humidity, and periodical mists and cloudy skies, to girdle the twigs and branches, resulting in the wilting of the contiguous area. Following exposure to atmospheric agencies, the diseased twigs acquire a streaky and fibrous aspect and the cortical tissues exude a considerable quantity of gum, which subsequently dries. The black sclerotia of the fungus develop on and under the cortex of the trunk and main branches, the twigs also being occasionally involved. Entry is effected through lesions caused by frost, sun scorch, agricultural implements, animal bites, and the like. Control measures should include scarification of the diseased bark, burning of infected refuse, and preventive applications of 1 per cent. Bordeaux mixture.

Rhoads (A. S.). **Condition of Citrus groves in Florida.** *Plant Dis. Reptr*, xxviii, 17, pp. 568–573, 1944. [Mimeographed.]

In February, 1944, citrus trees in the vicinity of Cocoa, Brevard County, Florida, were found to show marked distress as a result of prolonged drought. Many groves west of Vero Beach and Fort Pierce were affected by wither tip, as well as by general wilting and dying-back of the tops and heavy fruit drop. Where the groves were adequately irrigated, the trees were in good condition. Citrus decline at Wabasso was associated with an excessively high water table. At Davie (Broward County) citrus trees on muck soils have declined for several years, the trouble usually beginning when the trees are 12 to 14 years old.

An alarming form of decline was found at Winter Haven. In one grove, producing 400 to 500 boxes of fruit per acre some years ago, the trouble occurred on grapefruit, orange, and tangerine trees on rough lemon stock, grapefruit trees being most severely affected. The trouble started on one tree six or seven years ago, and spread until almost every tree over an area of 7 to 8 acres became affected, when the condition began to appear in an adjacent block of Valencia oranges. Irrigation gave only temporary improvement, and fertilizer treatments and soil amendments had no effect. When the trees were examined they were characterized by sparse foliage and small leaves, which showed signs of zinc and magnesium deficiency not apparent in adjacent healthy trees. The fruits from the affected trees were small. The trees appeared to die back uniformly throughout the crowns, but showed no tendency to fill up with water sprouts. As a rule, there was an abrupt transition from affected to unaffected trees. The same type of decline was also noted in another fine grove a considerable distance away. Here, too, perfectly healthy trees immediately adjoined the marginal declining trees of the affected areas.

Tree decline was also observed near Lake Alfred in a grove that suffered from drought, the trees having shown partial defoliation and dying back for several years. The root systems were in good condition, but few of the trees had made good tap-roots. The trouble is attributed to planting the trees on grapefruit rootstock, which was not adapted to the droughty character of the land.

Harvey (J. V.). **Fungi associated with decline of Citrus and Avocado in California.**—*Plant Dis. Reptr*, xxviii, 17, pp. 565–568, 1944. [Mimeographed.]

In attempts to determine the extent to which fungi are responsible for decline or collapse of avocado and citrus trees in California, examinations were made of roots and soils from diseased and healthy avocado, lemon, and Valencia orange trees and soils in many localities over a period of 3½ months, ending on 31st May, 1944. The tabulated results show that of 167 samples of diseased avocado, *Phytophthora cinnamomi* occurred on 54·5 per cent., *Pythium vexans* on 45·5, *P. ultimum*

on 35·1, *Trichoderma lignorum* [*T. viride*] on 22·7, and *Fusarium* spp. 1 and 2 on 9·4 and 10·9 per cent., respectively, while in a second lot of 120 healthy samples the corresponding percentages were 11·1, 31·7, 29·1, 25·0, 97·5 and 16·6, respectively. It is concluded that *P. cinnamomi* may be assumed to be of primary importance with respect to pathogenicity on avocado. No conclusions are drawn from the limited data on diseased citrus isolations.

Boom sprayers in Citrus orchards. *Calif. Citrogr.*, xxix, 10, p. 276, 2 figs. (1 on p. 277), 1944.

In 1940, the use of mechanically oscillating spray booms [*R.A.M.*, xxii, p. 476] to conserve labour in citrus spraying began to receive attention in California. While this form of spraying does not secure the depth of penetration of the foliage that is given by careful hand spraying, there are many diseases which do not require thorough inside coverage, and, further, there is a large acreage of thinly foliated trees.

Great improvements in boom equipment have been effected. The volume of liquid obtainable under high capacity pumps, e.g., 60 gals. per minute, appears to be fundamental to inside coverage. Much has yet to be learned about the most effective placement and angle of the nozzles. The speed of the rig and the speed and type of movement of the guns or nozzles all affect the results. The ultimate place of boom sprayers will not be established until more experience has been gained. At present, their most important feature is that they cover a greater acreage at lower cost than other types; they also make it possible to spray by night. Details are given of two boom-sprayers now in use.

Klotz (L. J.) & Fawcett (H. S.). **Progress report on 'decline' of Citrus.** *Calif. Citrogr.*, xxix, 10, pp. 294-295, 1944.

Describing the lines along which research on citrus decline in California is being conducted [*R.A.M.*, xxiii, p. 106], the authors state that in the lathhouse in small tanks in the presence of known rot fungi (*Phytophthora* spp.) waterlogging without drainage, using a solution of nitrates and organic matter, was rapidly fatal to 18 months old seedlings of lemon, Tresca shaddock, rough lemon and sour orange. Valencia orange, Windsor grapefruit, Sampson tangelo [tangerine × pomelo] and a seedling grapefruit, this being the order in which they succumbed. All were dead in four weeks. Where the same materials and organisms were used, and the roots were kept wet, but the soil had better drainage, the seedlings were still surviving after nine months. Seedlings with severely infected roots rapidly recovered when placed in soil in porous pots and given ordinary greenhouse care, the growth of new roots exceeding their destruction by fungi. This suggests that a similar sequence occurs in good groves where desirable orchard practices are maintained. In order of resistance to *P.* spp. of the fibrous roots Sampson tangelo was first, sour orange a poor second, and lemon, grapefruit, rough lemon and Valencia orange third. The order of resistance of the trunk bark of standard stocks to gummosis by the same fungi was sour orange and tangelo first, sweet orange, rough lemon, and grapefruit next, and lemon and citrange [*Poncirus trifoliata* × common orange] last. Tests on the tendency to nitrite injury [loc. cit.] of seedlings of rough lemon, Valencia orange, Homosassa sweet [? orange], Royal grapefruit, Alonzo grapefruit, pink shaddock, bitter-sweet orange, sour orange, and Sampson tangelo showed virtually no differences. Small concentrations of nitrous nitrogen or nitrites cause no visible injury to citrus roots, but reduce their water-absorbing ability as indicated by the rate of wilting when the plants are placed under drying conditions. The apparent order of resistance to decline of Eureka lemons on various stocks were reported as (1) Sampson tangelo,

(2) mandarin orange, (3) sweet orange, (4) grapefruit, (5) rough lemon, (6) sour orange.

Bitancourt (A. A.). **Um teste para a identificação precoce da tristeza dos Citrus.**—[A test for the early identification of Citrus 'tristeza'.]—*Biológico*, x, 6, pp. 169–175, 1944. [English summary.]

A test has been devised for the early identification of the 'tristeza' root rot of grafted oranges [*R.A.M.*, xxiii, p. 223], consisting in the application to the superficially scraped bark at the bud union of a 3 per cent. alcoholic solution of iodine. On diseased trees at the Biological Institute, Campinas, S. Paulo, Brazil, the starchy, dark-coloured parenchyma of the affected sweet orange scion contrasted sharply with the colourless tissues of the corresponding region in the immune sour orange stock, these reactions being reversed on the inner surface or phloem of the cortex. A faint response to the test may also be shown by externally healthy trees in an orchard containing diseased individuals, indicating the latent presence of the virus. Similar experiments at Riverside, California, where this form of root rot does not occur, were invariably negative.

The apparent failure in the translocation of carbohydrates through the phloem from the sweet orange tops to the sour orange roots is considered to explain the death of the rootlets and ultimately of the trees. It further lends weight to the author's theory that the disease is induced by a virus latent in the sweet orange from which the sour one is immune. The symptoms of 'tristeza', including the starch accumulation in the cortex and the death of the starved rootlets are comparable to those described by W. P. Raleigh, from the United States, as developing in Green Mountain potato scions infected by latent mosaic [potato virus X] grafted on resistant stocks of U.S.D.A. 41596 [ibid., xvi, p. 53].

Vasudeva (R. S.). **Studies on the root-rot disease of Cotton in the Punjab. XII. Control by varying sowing date.**—*Indian J. agric. Sci.*, xiii, 5, pp. 515–519, 3 graphs, 1943.

The results of five years' experiments, mostly conducted at Lyallpur and Khanewal, Punjab, on the relation between the date of sowing of cotton and the incidence of root rot (*Rhizoctonia* [*Corticium*] *solani*) and *Macrophomina phaseoli* indicated that early (first week in April) and late (near end of June) stands suffer less severely than those of May [*R.A.M.*, xxii, p. 204]. In one test in 1938, for instance, the average mortality for 83 A.F. (*Gossypium hirsutum*) sown on 5th April, 7th and 23rd May, and 2nd and 20th June was 4, 8·9, 18·9, 13, and 1·2 per cent., respectively, the corresponding figures for Mollisoni 39 (*G. arboreum* var. *neglectum* f. *bengalensis*) being 8·4, 43, 29·1, 23·6, and 0, respectively. Both native and American varieties sown late and planted closely gave satisfactory yields, but the output of American cottons from the early sowings was low.

Dastur (R. H.) & Tashna (U. C.). **Studies in the periodic partial failures of the Punjab American Cottons in the Punjab. VIII. The relation of weather factors with the spread of tirak in American Cottons.**—*Indian J. agric. Sci.*, xiii, 5, pp. 449–467, 10 graphs, 1943.

The fully tabulated results of the authors' comprehensive studies on the correlation between meteorological factors and the incidence of 'tirak' in American cottons in the Punjab [*R.A.M.*, xxiii, p. 225] indicate that the years of exceptional prevalence of the disease tend to be marked by spells of abnormally warm weather, persisting for ten days and upwards and sometimes accompanied by total absence of rain, in September and October. Such conditions obtained in the years 1921, 1926, 1927, 1928, and 1932, when losses of 20 to 45 per cent. of the crops were sustained. When the correlation coefficients between yields and the degrees

(2° to 5° F.) above the normal maximum temperature were determined, negative correlations were established between temperature and yields which were significant, or on the verge of significance, in the Multan and Montgomery districts.

Ahmad (N.) & Gulati (A. N.). **The effect of storage under certain specified conditions on the quality of Indian Cottons.**—*Indian J. agric. Sci.*, xiii, 5, pp. 494–514, 1 diag., 2 graphs, 1943.

Broach Desi 8 cotton, stored in bales in Bombay for 2½ years, showed distinct signs of deterioration, including fungal damage to the fibres by *Aspergillus* sp., *A. niger*, *Phycomyces* sp., *Penicillium* sp., *Cladosporium* sp., *Mucor* (?) *hygrophilus*, and (?) *Basidiobolus* sp., of which the two last-named are new records for India. Storage in desiccators at controlled humidities below 90 per cent. relative humidity did not lead to any deterioration in bundle strength in two years, but at saturated humidity both Broach Palej and Broach Desi 8 decayed completely in four to five months. The critical limit lay between 90 and 92 per cent. relative humidity, even a slight increase above the former involving an acceleration in the rate of decay. The incidence of infection was significantly lower for Broach Desi 8 than for Broach Palej. At a constant temperature of 92° F. and varying humidities there was no decrease in strength or increase in the incidence of infection over a period of 1½ years. Sprinkling stored cotton with water invariably results in loss of strength and deterioration in colour, usually accompanied by an increase of fungal infection, which may be minimized by the addition to the water of 0·5 to 1 per cent. formalin.

Neal (D. C.). **Rhizoctonia leaf spot of Cotton.** *Phytopathology*, xxxiv, 6, pp. 599–602, 2 figs., 1944.

A hitherto unreported leaf spot of cotton caused by *Corticium solani* was observed in mid-July, 1943, on Deltapine plants at Baton Rouge, Louisiana, and subsequently in adjacent fields on Coker, Delfos, and other varieties. The symptoms are distinctive, consisting of light brown, dark purple bordered, interveinal spots of irregular shape and variable size, which later become necrotic, the diseased tissues cracking or falling out and presenting a ragged, shot-hole aspect. At the same time the surrounding tissues assume a chlorotic discoloration. The light to yellowish-brown mycelium of the fungus was present in abundance on and near the lesions on the lower leaf surfaces. The fungus was readily isolated on potato dextrose agar and inoculated with positive results on the Coker, Deltapine, and Delfos varieties, the incidence of infection on which amounted to 80, 60, and 83·3 per cent., respectively. Under the conditions of cloudy skies and moderate temperatures favouring infection by *C. solani*, the incubation period was about six or seven days. Although the leaf spot causes a certain amount of shedding, the reduction of yield from this source has not so far been substantial.

Drechsler (C.). **A species of Arthrobotrys that captures Springtails.** *Mycologia*, xxxvi, 4, pp. 383–399, 6 figs., 1944.

After stating that of the predacious fungi, 3 prey mainly on rotifers, 5 habitually on testaceous rhizopods, 24 habitually on amoebae, and 29 habitually on nematodes, the author describes his study of a Hyphomycete which, though not more robust than the related nematode-capturing forms [*R.A.M.*, xxiii, p. 299], is yet adapted to prey primarily on insects; under natural conditions it is probably wholly given to a predacious mode of life. The fungus, *Arthrobotrys entomopaga* n.sp., appeared in 14 Petri plate cultures planted on 18th September, 1943, with discoloured rootlets of *Polygonum pennsylvanicum* freshly collected from moist ground near a brook in Arlington, Virginia. Bacterial development allowed

gradual multiplication of rhizopods and eelworms, which led to the development of fungi subsisting on them. On 1st November, many dead springtails of the genus *Sminthurides* were found in small areas near the decaying rootlets. The clustered arrangement of the dead insects and the constant proximity of many erect columnar processes indicated that a predacious fungus was the agent of destruction.

During the next ten days numerous additional groups of columnar processes developed, mostly at increasingly greater distances, from the root material where the first groups originated. This was accomplished by radial extension of narrow, straight, hyaline, septate, prostrate hyphae which for relatively long distances showed meagre branching. At intervals, however, these hyphae widened and gave off several branches close together and almost at right angles. Near their points of origin, the branches anastomosed or gave off secondary branches which anastomosed, so forming a hyphal net prostrate on the surface of the substratum. Many segments then sent up individually an erect process consisting of a stout, stalk-like basal cell with a wider, ovoid or prolate-ellipsoidal, distal cell. This secreted a colourless adhesive liquid. In cultures protected against evaporation the adhesive liquid often appeared as a droplet 15 to 20 μ in diameter, but more frequently it appeared as a strongly collapsed, irregularly lobate envelope surrounding the distal cell. Through secondary development a new erect process was often sent up from the base of a procumbent stalk or a prostrate distal cell; or a new adhesive process arose from an older prostrate stalk and the glandular cell originally surmounting it; or two new adhesive processes arose from a prostrate glandular cell, one or the other sometimes giving rise to an adhesive process of tertiary origin.

Borne at a height of 10 to 15 μ, the distal glandular cell was well placed for adhering to the ventral side or legs of the low-bodied prey. The abundant elaboration of sticky exudate beforehand rendered escape of the insect impossible. Owing to the close arrangement of the erect processes in groups, several of them probably often adhered to the insect at the same time.

The captured springtails were invariably permeated with mycelium, penetration being accomplished, apparently, by the glandular cells most directly operative in the capture.

Shanor (L.) & Saslow (H. B.). **Aphanomyces as a Fish parasite.** - *Mycologia*, xxxvi, 4, pp. 413–415, 1 fig., 1944.

During November, 1942, *Lebistes reticulatus*, *Anoptichythys jordani*, and a hybrid of *Platypoecilus maculatus* × *Xiphophorus helleri* in aquaria at the University of Illinois became attacked by a sterile species of *Aphanomyces* which caused the death of the fish (both adult and young) in a week after the development of the lesions. No infected fish recovered and all the species infected showed equal susceptibility. The source of the inoculum was probably food grown in containers of fresh water.

The first sign of infection was a peculiar dorsal hump, the parasite generally developing most extensively in the dorsal region. A few days later, the mycelium became evident as whitish lumps in the distended musculature. Hyphae then began to protrude from the lumps in tufts extending from the skin for a length of 2 mm. The *Aphanomyces*, which has not been identified, appeared to be solely responsible for the disease. It is evidently a facultative parasite which may become destructive under suitable conditions.

Barnett (H. L.) & Houston (B. R.). **Curly top on Flax and other Flax diseases in central California in 1944.** *Plant Dis. Reptr*, xxviii, 15, pp. 507–508, 1944. [Mimeographed.]

During 1944, the three flax diseases present in western Tesno County, California,

in 1942 3, viz., pasmo (*Septoria linicola*) [*Sphaerella linorum*: *R.A.M.*, xxi, pp. 5, 418], browning (*Polyspora lini*) [ibid., xxiii, pp. 17, 90], and anthracnose (*Colletotrichum linicola*) [ibid., xxiii, p. 17], were relatively scarce. Curly-top disease [beet curly-top virus], on the other hand, was general throughout the area. Affected plants were first found early in March, the diagnosis being confirmed by Dr. H. H. P. Severin. Infection was highest at the margins of the fields (between 1 and 5 per cent.) in places where the stand was sparse, and in fields planted between October and the end of December. Fields planted after December showed only a few affected plants.

Lachance (R. O.) & Payette (A.). **Quelques observations sur l'anthracnose du Lin.** [Some observations on Flax anthracnose.] *Rep. Quebec Soc. Prot. Pl., 1936–1943*, pp. 53–55, [1944].

In October, 1942, the authors found *Colletotrichum lini* [*C. linicola*] on flax seed from crops grown in nearly every parish of the counties of Islet and Kamouraska, Quebec. Infection, however, appeared to be generalized and considerable only in the county of Islet, where the Gossamer variety is grown. Only a very small percentage of infection was found on seed of the Cirrus variety, the cultivation of which is confined to the neighbourhood of Sainte-Anne-de-la-Pocatière.

The fungus reduced germination, and in some cases destroyed the seedlings at or before emergence. Most of the plants, however, reached a height of 3 or 4 in. before anthracnose symptoms appeared. Occasionally, the fungus was isolated from apparently healthy stems and seed.

Loss of virulence did not follow prolonged exposure (in the markets) to temperatures of 30° F. below zero. The fungus was also able to withstand a temperature of 65° C. for three hours. In damp heat, on the other hand, the fungus was rapidly destroyed at temperatures over 35° C.

Seed treatment for 10 minutes in water at 126° F. destroyed almost all species of *Alternaria* without affecting germination; treatment at 136° for 10 minutes destroyed *C. lini*, but reduced germination by about 30 per cent. In trials with a number of fungicides used as seed treatments, arasan, semesan, and ceresan gave the most promising results.

Medina (J. C.). **'Leaf basal necrosis' of Sisal (English 81).** *Bragantia, S. Paulo*, iii, pp. 73–84, 1943. [Abs. in *Chem. Abstr.*, xxxviii, 15, p. 4011, 1944.]

Necrosis of sisal leaf bases was effectively combated in São Paulo, Brazil, by the application of a potassium sulphate fertilizer in the first year of cultivation (two years after planting in the nursery). The affected and unaffected parts of the foliage in diseased plants, the apparently healthy parts of the same, and the foliage of normal plants contained, respectively, ash 5·334, 8·921, and 9·082; potash 0·463, 0·736, and 0·992; calcium oxide 3·726, 5·842, and 5·689; phosphorus 0·163, 0·260, 0·393; total nitrogen 1·117, 1·501, and 1·807; and magnesium oxide 0·795, 1·680, and 1·485 per cent. of material dried at 100 to 110° C.

Plakidas (A. G.). **Black scale: a disease of Easter Lily bulbs.** *Phytopathology*, xxxiv, 6, pp. 556–571, 4 figs., 1944.

Colletotrichum lilii n.sp. is the name applied to the agent of a serious disease of Easter Lily (*Lilium longiflorum*) known as black scale in Louisiana, where investigations on its etiology were carried out from 1937 to 1939. The colour of the scales of affected bulbs ranged from brown to nearly black in place of the normal white to lemon-yellow, the injury involving the epidermis and two to four layers of the subepidermal cells. The lesions predominate on the apical half and outer surface of the scales, and impart such an unsightly appearance to the bulbs as to

render them unsaleable, though the plates, roots, and core appear to remain normal.

Besides *C. lilii*, which was isolated from 178 tissue plantings from six lots of black-scale lesions, species of *Fusarium* and *Penicillium* developed in 149 and 92 cultures, respectively. In preliminary inoculation tests in the laboratory on healthy scales and bulblets, all three fungi caused rotting, the *F.* isolates being the most aggressive and those of *P.* sp. the least so. The soft type of decay resulting in each case was ordinarily very similar, but in two instances *C. lilii* induced a rather shallow, sunken, dry rot comparable to that observed in nature. In soil infestation trials, however, there was no difficulty in recognizing *C. lilii* as the agent of the typical black-scale symptoms, 91·1 per cent. infection occurring in one series and 87·5 in another. Negative results were obtained in a limited number of experiments in the control of the disease by chemical treatment of the bulbs or soil.

C. lilii is described [in English only] as having small, mostly gregarious acervuli, arising subcuticularly on a small, dark brown stroma, 43 to 122 (average 67·2) μ in diameter, and furnished with an abundance of dark brown, rigid, straight, continuous or septate setae, 29·7 to 72·6 by 4 to 5·3 (45·7 by 4·9) μ; hyaline, subconical conidiophores, 10 by 4·5 μ; and hyaline, falcate, continuous, subacute, usually vacuolate conidia, 13·2 to 23 by 3·6 to 4·9 (18 by 3·7) μ.

Smith (F. F.) & Brierley (P.). **Preliminary report on some mosaic diseases of Iridaceous plants.**— *Phytopathology*, xxxiv, 6, pp. 593–598, 1 fig., 1944.

In 1939 corms of *Tigridia pavonia* were received from a western Washington grower with the statement that a mosaic-like disease had spread rapidly through a previously normal planting. Similar mottling symptoms have been observed in *Gladiolus* in various localities, including the Plant Industry Station, Beltsville, Maryland, and in plants of *Babiana*, *Ixia*, *Sparaxis*, *Streptanthera cuprea*, *Tritonia lineata* and *T.* hybrids (*Montbretia* among them), and *Watsonia marginata*, from commercial sources in New Jersey, Ohio, and California, indicating a wide distribution in the United States of the virus or viruses concerned.

The foliage and flower bracts of plants raised from the above-mentioned *T. pavonia* corms bore pale- to yellowish-green, irregular streaks and blotches, sometimes accompanied by an inconspicuous, pale or more rarely dark, streaky 'breaking' of the flower colour. Picardy *Gladiolus* plants with 'broken' flowers were selected in the field in 1941 and grown under glass in 1942. The young leaves formed in April and May developed a fine-grained, angular, green mottling, and the flowers, pink in bud, showed a distinct pale-streaked or spotted 'breaking' when full-blown or fading. Naturally infected *Ixia* hybrids displayed either a bright yellow, angular or alternate pale and dark green mottling of the leaves and streaky, pink 'breaks' in the white flowers. Darker, 'tear-drop' flower 'breaks' were detected in *Babiana* hybrids, while those of *Sparaxis* exhibited a strong, green foliar mottling, with a frequent crinkling and pinching not hitherto observed among the Iridaceae.

The *Tigridia* mosaic virus was experimentally shown to be transmissible by means of *Aphis gossypii*, *Macrosiphum lilii*, and *Myzus circumflexus*, and that of *Gladiolus* by the last-named and *M. persicae*, neither being communicable through the sap. *M. persicae* further conveyed infection from mottled *Babiana*, *Ixia*, *Sparaxis*, *Streptanthera*, *T. pavonia*, and *W. marginata* to *Tritonia crocata*.

Cucumber mosaic virus was found occurring spontaneously on *Sparaxis* hybrids, whence it was transferred by *M. persicae* to Clara Butt tulips and by mechanical methods to Turkish tobacco, White Spine cucumber, *Zinnia elegans*, and *Mesembryanthemum crystallinum*.

Bergström-Kiellander (Ingrid). **Undersökningar över vissnesjuka hos Sommaraster Callistephus chinensis (L.) Nees.** [Investigations on wilt disease of the China Aster, *Callistephus chinensis* (L.) Nees.] *Medd. Växtskyddsanst., Stockh.*, 42, 78 pp., 10 figs., 4 graphs, 1944. [English summary.]

Aster (*Callistephus chinensis*) wilt disease (*Fusarium conglutinans* var. *callistephi*) was first observed in Sweden by T. Lindfors in 1917 (unpublished information), since when it has been reported from various parts of the country. From 1939 to 1942 it was included in the investigation programme of the State Plant Protection Station. In general, the field experiments in five localities with different varieties permitted of a uniform rating in respect of reaction to wilt, but marked and so far inexplicable departures from the normal behaviour of the various aster types were observed at one place in 1941. According to Jones and Riker [*R.A.M.*, xi, p. 302], 50 per cent. resistance constitutes a reasonable line of demarcation between desirable and undesirable varieties for breeding purposes, but the writer regards this standard as unduly low and hardly likely to satisfy the majority of growers. Absolute immunity was not claimed by the American workers for any of their resistant varieties, but here again Swedish experience differs. Both in trials at the Plant Protection Institute and in several years' commercial cultivation, a number of varieties proved 100 per cent. resistant, while conversely, 100 per cent. infection was contracted by susceptible varieties in heavily infested soils: similar results were obtained by Storck in Germany [ibid., xiv, p. 447].

The author describes the symptoms of the disease, her inoculation experiments, the successful experimental control of the disease in 1939 and again in 1942 by treating aster-sick soils with formaldehyde, and cultural studies on the various fungi isolated from asters.

The *Fusarium* strains isolated from diseased plants were examined by H. W. Wollenweber and identified as *F. conglutinans* var. *callistephi*, the nomenclature of which is discussed in the light of Padwick's and Snyder and Hansen's views [ibid., xix, p. 495; xx, p. 82].

Dodge (B. O.). **Canker-blight of Pachysandra.**—*J. N.Y. bot. Gdn.*, xlv, 535, pp. 159–163, 2 figs., 1944.

A planting of *Pachysandra* (closely related to *Buxus*) growing at Bronxville, New York, was observed to show a canker blight characterized by the presence of numerous dead or dying stems which either bore cankers several inches long or were dead at the tip ends for several inches down. Cuttings from healthy plants were sprayed with a spore suspension of a fungus obtained from affected material, in some cases the leaves being wounded, and it was found that brown discoloured areas developed at first only on the wounded parts, and then spread along the stems and into the leaves. When spores were placed on unwounded leaves and stems, no infection occurred, except when a leaf was kept for a long time in contact with the moist filter paper bearing the spores. The disease is considered to be due to an undescribed species of *Volutella* that is primarily a wound parasite.

The fungus appears to be widely distributed in the area. Cuttings should not be taken from plants where the disease is evident. Clipping the leaves should be avoided. The cutting knife should be dipped in alcohol after it has been used to trim off dead stems or leaves. The host should not be grown in places where it is possible for the public to walk through the plantations. If the plants develop the condition they should be treated with Bordeaux mixture or some other fungicide.

Affected material also showed the presence of bright orange-red to dark red ascocarps of a fungus belonging to the Nectriaceae. These represent the perfect stage.

Black (L. M.). **Some viruses transmitted by Agallian leaf-hoppers.**—*Proc. Amer. phil. Soc.*, lxxxviii, 2, pp. 132–144, 7 figs., 1944.

In addition to the New York and New Jersey potato yellow dwarf viruses [*R.A.M.*, xxi, p. 36], two hitherto unknown viruses were found affecting crimson clover (*Trifolium incarnatum*) colonized by the leafhopper *Agalliopsis novella*. One of these new entities causes enlargement of the veins while the other delays the opening of the leaves and imparts to the young foliage the aspect of small clubs: on the basis of these outstanding symptoms they are allotted, respectively, the common names of 'big vein' and 'clover club-leaf'. A new genus is further proposed to accommodate all four viruses under discussion, namely, *Aureogenus*, the New York, New Jersey, big vein, and clover club-leaf forms to be known, respectively, as *A. vastans* var. *vulgare* n.comb., *A. vastans* var. *agalliae* n.comb., *A. magnivena* n.sp., and *A. clavifolium* n.sp.

A. vastans var. *vulgare* was transmitted by *Aceratagallia sanguinolenta*, *A. lyrata*, *A. obscura*, and *A. curvata*; only two out of 465 tests with *Agallia quadripunctata* and possibly one out of 220 with *Agalliopsis novella* were successful. *Aureogenus vastans* var. *agalliae* was transmitted by *Agallia constricta*, *A. quadripunctata*, and possibly by *Agalliopsis novella* in one out of 241 tests. *Aureogenus magnivena* was conveyed from diseased to healthy plants by *Agallia constricta*, *A. quadripunctata*, and *Agalliopsis novella*, while the last-named was the only vector of *Aureogenus clavifolium* in these experiments.

Evidence is presented, based on the similarity of the systemic symptoms induced by both viruses in *Nicotiana rustica*, Green Mountain potatoes, *Chrysanthemum leucanthemum* var. *pinnatifidum*, and crimson clover, as well as on protection tests on the first-named host, of the very close relationship between the New York and New Jersey agents of yellow dwarf. The affinities of the big vein and clover club-leaf viruses are less clearly defined. Like the New York and New Jersey types, they cause yellowing and not a typical mosaic, but their distinctive features and failure to infect *N. rustica* and potato may be interpreted as pointing to the absence of relationship: in any case, the two new viruses do not appear to be as closely akin to the two previously described as the latter are to each other.

Hills (K. L.). **The reaction of varieties of Trifolium subterraneum to attack by Uromyces trifolii as a heritable character.**—*J. Coun. sci. industr. Res. Aust.*, xvii, 2, pp. 74–78, 1944.

When the highly susceptible, mid-season Mt Barker variety of subterranean clover was crossed with the immune, early Mulwala variety, resistance to leaf rust (*Uromyces trifolii*) [*R.A.M.*, xv, p. 810] was ascertained to be an inherited character. Susceptibility was apparently dominant, though the data were inadequate for a definite conclusion. The F_2 had 96 plants with an infection rating of 0, and 9, 17, and 205 with ratings of 1, 2, and 3 (the highest); the progeny of uninfected F_2 plants remained free from rust. There was some evidence of linkage between time of flowering and resistance, early maturity tending to be associated with resistance; however, combinations of earliness and susceptibility and of lateness and resistance were frequent. Both early and late segregates were obtained in the third generation which were immune from attack and largely possessed of the agronomic characters of the parents. It seems probable that a variety could be developed from the cross which should combine the desirable agronomic characters of Mt Barker with the rust resistance of Mulwala.

Preston (D. A.). **Diseases of grasses in Oklahoma.**—*Plant Dis. Reptr*, xxviii, 17, p. 562, 1944. [Mimeographed.]

This list of fungal diseases found on grasses growing in the Federal grass Nursery, Stillwater, Oklahoma, and the vicinity, on 3rd to 4th May, 1944, includes

the following new host records: *Colletotrichum graminicola* on *Agropyron elongatum*, *A. intermedium*, and *A. smithii*, *Ellisiella caudata* on *A. trachycaulum*, and *Scolecotrichum graminis* on *Alopecurus carolinianus*.

Noer (O. J.). **Fungicides for snow mold control.** —*Greenk. Reptr*, xii, 3, pp. 13–14, 24–25, 4 figs., 1944.

Of the various fungicides applied to park and club greens at Milwaukee, Wisconsin, for snow mould [*Typhula*: *R.A.M.*, xxiii, p. 111] control in November, 1943, calo-clor, thiosan, and Du Bay 1205 gave the most promising results, but in the absence of severe infection during the abnormally mild winter, the conclusions to be drawn from the tests are purely tentative. For the time being, northern greenkeepers should rely on a mixture of 2 parts calomel [mercurous chloride] and 1 of mercuric chloride or thiosan, the former to be applied at a dosage of 3 to 4 and the latter at 6 to 8 oz. per 1,000 sq. ft. just before the first snowfall is expected.

Kemp (H. K.) & Beare (J. A.). **Little leaf in deciduous fruit trees and Vines.** *J. Dep. Agric. S. Aust.*, xlvii, 11, pp. 470–479, 12 figs., 1944.

During the past few years, 'little leaf' of deciduous fruit trees caused by zinc deficiency [*R.A.M.*, xxii, p. 252] has been found in South Australia in the Murray Valley irrigation area, the Lower South-East, the eastern slopes of the Mount Lofty Ranges, at McLaren Vale in the south, and in the northern districts at Barossa Valley, Clare, Bundaleer Springs, and Wirrabara. The disease, first described from the Middle North about 1920, has been a main factor in the abandonment of orchard cultivation in some parts of that area.

In 1939–40, the condition was found to be causing great damage to stone and pome fruits on the deep sands along the Murray River. Very few apple trees are grown locally, but almost every tree examined was severely affected. Pears were affected in the older blocks, even on the heavier soil types, and peach and apricot plantings were in many cases being replanted to citrus. Such cases were very common in Mypolonga, Waikerie, Kingston, Moorook, and Buri. At Renmark, the disease appeared to have been present over a longer period, and on the soils most subject to it deciduous fruit trees had been replaced by citrus and sultana vines some years before.

The first type of tree fruit to become affected appears to be apple, followed by peach and nectarine, and then by apricot. Pears appear to be much less susceptible than apples, and citrus than stone and pome fruits. Progressive replanting to citrus of stone-fruit areas dying out as a result of little leaf is common, and in many cases the citrus trees have grown for many years without signs of damage. Replanting with stone fruits is, however, unsuccessful as a rule, the trees succumbing in a few years after a very stunted existence. Not uncommonly, when most of the trees in an affected block have been replanted to citrus, the remaining stone fruit trees have recovered.

The most susceptible vine varieties commonly grown in the Murray Valley are Muscat Gordo Blanco, Pedro Ximines, and the Zante currant. Where stone fruits in the vicinity showed marked symptoms of little leaf, these vine varieties commonly show chlorosis, particularly Gordo Muscat. Sultanas appear to be the least susceptible of the vine varieties grown on the Murray. In the most severe cases, the canes are weak and slender and have very short internodes, while the leaves are chlorotic and about one-third of normal size. The buds in the leaf axils often burst, giving rise to very short growths with leaves under 1 in. across. Vines breaking normally may become intensely chlorotic at 6 to 10 in. of cane growth, and later recover, apparently as a result of irrigation. Vines less severely affected may show no obvious symptoms, but their yield is low and their growth lacks vigour; such vines gave marked response in point of yield to zinc applications.

The treatments recommended in the light of experimental results are: for peaches, spray with zinc sulphate 30 to 50 lb. per 100 gals. for the first two years, and afterwards omit the treatment in some years or reduce the strength; for apricots, (1) spray annually with zinc sulphate, 30 lb. per 100 gals. annually, (2) apply zinc 'tingles' to the butt or main limbs, six per in. of circumference in six rows, the 'tingles' being 1 in. apart in each row; for pears, spray with zinc sulphate, 50 lb. per 100 gals.; for apples, spray with zinc oxide, 3 lb. per 100 gals. in summer, or with zinc sulphate 50 lb. per 100 gals. in winter; for vines, swab immediately after pruning with zinc sulphate, 2 lb. per gal.

Barnett (H. L.). **Stone fruit diseases in central California.**—*Plant Dis. Reptr*, xxviii, 12, pp. 424–425, 1944. [Mimeographed.]

Almonds and apricots were the only fruits generally attacked by the blossom-blight phase of brown rot in central California during the spring of 1944, *Sclerotinia laxa* being responsible for all the infection on almond (153 cultures from ten counties) and most of that on apricot (75 cultures from five counties); *S. fructicola* was isolated from only three flowers of the latter host in Santa Clara County. The cultural criteria used for the differentiation of the two species were those laid down by Leach and Hewitt [*R.A.M.*, xviii, p. 533]. *S. laxa* was further isolated from four prune flowers and *S. fructicola* from two in Sonoma County; 15 collections from the same host in Alomeda County gave rise to the former species. Cherry blossoms in Santa Clara County yielded 26 cultures of *S. laxa* and none of *S. fructicola*, whereas 29 collections from the same host in Sonoma County were identified as the latter species and only one as the former.

Evidence was obtained that the spring infection of almond rust (*Tranzschelia* [*Puccinia*] *pruni-spinosa*) in Monterey County, California, is initiated by the uredospores overwintering on old green leaves on sucker shoots.

Hildebrand (E. M.). **Prune dwarf and the Cherry virus complex.**—*Science*, N.S., c, 2590, pp. 147–148, 1944.

The results of cross-inoculation tests repeated in three successive years at the New York State College of Agriculture have shown that strain 1 of the sour cherry yellows virus [*R.A.M.*, xxiii, p. 234] and one strain of the sweet cherry chlorotic spot or mottle virus are actually strains of the prune dwarf virus [ibid., xxii, p. 487]. Comparative experiments with prune dwarf virus, ten different cultures of the sour cherry yellows and ring spot viruses, alone or combined, and two of sweet cherry chlorotic spot virus on 12 distinct varieties or species of stone fruits yielded clear evidence that strain 1 of the cherry yellows virus, inducing rosette and stunting of peach seedlings [ibid., xxii, p. 70], is likewise responsible for symptoms simulating prune dwarf on Italian prune and Lombard plum [ibid., xxii, p. 31]. Moreover, one strain of sweet cherry chlorotic spot virus invariably induces typical prune-dwarf symptoms on the two last-named hosts. Damson plums contract chlorosis and stunting when infected by the cherry yellows strain, but not as a result of exposure to the typical prune dwarf or sweet cherry strains.

Based on severity of symptoms on Italian prune, the damson, sweet cherry, and sour cherry strains fall in descending order, the same applying to the virulence of rosette, stunting, and necrosis on Rochester peach.

Rhoads (A. S.). **Target leaf spot of Papaya in Florida.**—*Plant Dis. Reptr*, xxviii, 17, p. 575, 1944. [Mimeographed.]

Papaws in Dade County and Palm Beach County, Florida, are widely affected by a target leaf spot (more serious than that due to *Mycosphaerella caricae*) which is considered by Ruehle to be the same as the disease described by Acuno and Zayas from Cuba as due to *Phyllosticta caricae-papayae*. The small, necrotic spots

are most numerous near the leaf margins but enlarge rapidly in a symmetrical fashion, becoming circular in outline. A target-like effect soon results from concentric rings of black perithecia of a species of *Mycosphaerella*. The centres of the spots eventually disintegrate, producing a ragged effect. The pathogenicity of the fungus has not yet been established.

Goodwin (M. W.), Hopperstead (S. L.), & Kadow (K. J.). **Insecticide diluents. Solubility of arsenicals and copper fungicides as affected by diluents in agricultural dusts.**—*Soap, N.Y.*, xx, 8, pp. 103–107, 2 graphs, 1944.

At the Delaware Agricultural Experiment Station, dust mixtures were prepared, with and without calcium arsenate, using 48 different diluents, each with red cuprous oxide, tribasic copper sulphate, and copper oxychloride. In general, the lower the P_H, the higher was the water-soluble arsenic, very little of which was liberated above P_H 11. Copper oxychloride exerted the strongest buffering action of the three copper compounds, and therefore may be the safest in use in dust mixtures containing no calcium arsenate, whereas the other two, with their high P_H, are likely to give better results where the latter compound is present. It is concluded that a dust mixture containing copper fungicides without calcium arsenate should have a reaction about P_H 5, while one of P_H 11 is indicated for calcium arsenate-containing preparations.

Meyer (J. R.). **Ação bacteriostatica da 'orelha de pau' vermelha (Polyporus cinnabarinus).** [Bacteriostatic action of the red 'ear of corn' (*Polyporus cinnabarinus*).]—*Biológico*, x, 6, pp. 165–168, 3 figs., 1944. [English summary.]

Extracts from the fruit bodies of *Polyporus* [*Polystictus*] *cinnabarinus*, a common wood-rotting fungus of southern Brazil, were experimentally shown actively to inhibit the growth of the Gram-positive bacteria, *Staphylococcus aureus*, *Streptococcus pyogenes*, and *Pasteurella avicida*. The bacteriostatic substance, which is readily soluble in water and practically innocuous to laboratory animals, retains its properties during several weeks' storage at room temperature and withstands five hours' boiling.

Ramsbottom (J.). **Edible fungi.**—35 pp., 16 col. pl., 4 figs., Penguin Books Ltd., West Drayton, Middlesex, 1944. 2s.

Following an interesting account of the history, geographical distribution, past and present uses, real and legendary origins, and methods of cooking of edible fungi, the author describes, in sufficient detail for easy recognition, the outstanding characteristics of 20 British species, with other essential information relative to their preparation. The attractive coloured plates are by Rose Ellenby.

Reyniers (J. A.). [Ed.] **Micrurgical and germ-free methods. Their application to experimental biology and medicine.** –xiv +274 pp., 3 pl., 38 figs., 40 diags., 2 graphs, Springfield, Illinois, U.S.A., C. C. Thomas; London, Baillière, Tindall & Cox, 1943. $5.00.

Included in this symposium by various authors on the applications of micrurgical and germ-free procedures to experimental biology are a chapter (III) by E. M. Hildebrand on micrurgy and botany with special reference to phytopathology, and one by P. R. White (VIII) on germ-free plants and plant parts as material for physiological and pathological studies. The former deals, *inter alia*, with the cytopathology of virus, bacterial, and fungal diseases of plants, and the latter with the procurement and maintenance of aseptic plant material for the study of mycorrhiza, viruses, and crown gall [*Bacterium tumefaciens*]. Each of the eleven chapters comprised in the manual is supplemented by a bibliography of the pertinent literature.

Mujica (F.). **Immunización mediante la formación genetica de variedades resistentes a las enfermedades de las plantas.** [Immunization by means of the genetic production of varieties resistant to plant diseases.]—*Bol. Sanid. veg. Chile*, iii, 1, pp. 15–30, 1943.

This is a survey of some notable recent advances in the development of immunity in plants by genetic methods.

Rosenquist (O.). **How Sweden produces yeast for nutritional purposes.**—*Food Industr.*, xvi, 6, pp. 74–75, 118, 1 diag., 1944.

Full details are given of the process used in Sweden for making yeast from sulphite waste liquor as a by-product in sulphite alcohol manufacture and *Torula* yeast [cf. *R.A.M.*, xxiii, p. 399] from the distillery wash. The former type, which is relatively inexpensive and of inferior quality, is used as fodder, while the latter is fit for human consumption. An outline of the necessary installations, power, material, and labour requirements, and data on costs and nutritional values are given.

Pope (S.). **A new species of Metarrhizium active in decomposing cellulose.**—*Mycologia*, xxxvi, 4, pp. 343–350, 2 figs., 1944.

An account is given of the author's study of a fungus isolated from deteriorated baled cotton stored in Washington, D.C., and found to have extraordinary activity in decomposing cotton fabric. It has been used in the evaluation of mildew-proofing agents and the resistance of fabrics to rotting. It is easily handled in culture, sporulates freely, and has remained stable in its cultural characteristics and cellulose-decomposing activity for three years.

The fungus, which is named *Metarrhizium glutinosum* n.sp. [cf. *R.A.M.*, xxiii, p. 309], when grown on filter paper produces a sparse, white mycelium in which arise small tufts of compact conidiophores that form a palisade layer in each tuft. The moist conidial masses produced on these tufts often coalesce, forming masses 0·5 to 2 mm. in diameter. The dusky olive-green to olivaceous-black, cylindrical conidia have rounded ends, measure 6 to 9·6 by 1·5 to 3·9 μ, are formed on sterigmata in basipetal succession and united by disjunctors, but break away in the conidial mass soon after formation. The penicillately branched, erect, septate conidiophores measure 50 to 85 μ in length; the ultimate branches are verticillate, composed of 1 to 3 sterigmata, and measure 10 to 22 μ in length. The chlamydospores are produced in bulbous terminal portions of the hyphae found near the substratum and embedded in the mycelium. The mature chlamydospores are almost round, smooth, buckthorn-brown, measure 7·4 to 9 μ in diameter, and have a small, tapered papilla at one side.

Norris (D.). **Preservation of tube cultures of fungi and bacteria with liquid paraffin.**—*J. Aust. Inst. agric. Sci.*, x, 2, p. 77, 1944.

On 24th August, 1943, week-old cultures of nine fungi were covered with commercial paraffin sterilized in an autoclave. On 10th March, 1944, subcultures of all of them were made, and grew vigorously, though the controls without paraffin were useless. The cheapness and simplicity of this technique and its remarkable effectiveness warrant its trial by plant pathologists.

Baker (Gladys E.). **Heterokaryosis in Penicillium notatum.**—*Bull. Torrey bot. Cl.*, lxxi, 4, pp. 367–373, 1 pl., 1944.

A preliminary account of this cytological study of *Penicillium notatum* has already been abstracted [*R.A.M.*, xxiii, p. 398]. Assimilative hyphae are plurinucleate or binucleate, and this condition is maintained in the phialides.

Bibliography of references to the literature on the minor elements and their relations to plant and animal nutrition. Fourth supplement to the third edition.—92 pp., Chilean Nitrate Educational Bureau, Inc., 120, Broadway, New York, 1943.

The present supplement to the third edition of this valuable compilation originated by L. G. Willis [cf. *R.A.M.*, xvi, p. 276], contains nearly 700 references to, and abstracts of, contemporary studies on various aspects of the relation between the minor elements and the nutrition of plants and animals. A large number of the papers deal with matters of phytopathological interest.

Sherbakoff (C. D.) & Stanley (W. W.). **The most important diseases and insect pest crops of Tennessee.**—*Bull. Tenn. agric. Exp. Sta.* 186, 142 pp., 95 figs., 1943. [Abs. in *Exp. Sta. Rec.*, xci, 2, p. 162, 1944.]

Brief descriptions are given of the principal diseases and pests of the main Tennessee crop plants, exclusive of forest trees, together with recommendations for their control. The manual further includes sections on soil management in relation to disease control, care of plant beds, seed treatment, and spraying and dusting both with plant-protectives and hormones.

Katzman (P. A.), Hays (E. E.), Cain (C. K.), van Wyk (J. J.), Reithel (F. J.), Thayer (S. A.), & Doisy (E. A.). **Clavacin, an antibiotic substance from Aspergillus clavatus.**—*J. biol. Chem.*, cliv, 2, pp. 475–486, 2 graphs, 1944.

Methods for the production, preparation, and purification of clavacin, an antibiotic substance produced by *Aspergillus clavatus* [*R.A.M.*, xxiii, p. 183], are described, and evidence is presented confirming its identity with patulin. Clavacin is active against both Gram-negative and Gram-positive bacteria and certain fungi, viz: *Rhizopus nigricans* [*R. stolonifer*], two strains of *Monilia* [*Candida*] *albicans*, two strains of *Saccharomyces cerevisiae*, and *Sporotrichum schencki*.

Kelley (A. P.). **The process of phagocytosis in mycorrhizae: with especial reference to a phenological study of mycorrhizal phagocytosis in Fraxinus americana.**—16 pp., 3 figs., Landenberg Laboratory, Landenberg, Pa, 1943. [Mimeographed.]

The term phagocytosis is here formulated broadly as 'the digestion within a cell of some substance foreign to the cell's substance' and is more particularly applied to the digestion of fungal material by a non-fungal cell. The author gives a general description of mycorrhizal phagocytosis, followed by a review of literature on phagocytosis in liverworts, mosses, pteridophytes, gymnosperms, and angiosperms.

A study of stained root material from an American white ash (*Fraxinus americana*) collected at weekly intervals from March to June led to the conclusion that the fungal material is probably held in the mycorrhizal rootlets over winter and used in the spring by a phagocytotic process in development of new tissues for the host plant. As reported by other workers for other species of hosts, the phagocytotic activity in the ash was confined to a certain region, namely the mid-cortex. In true mycorrhiza the area of phagocytosis is always localized in the innermost region invaded by the fungus. The digestion is preceded by coiling, clotting, branching, or other changes in the hyphae. These changes are ordinarily induced by immersion of the hyphae in a solution of unfavourable ionic concentration, the degree of change being related to the degree of concentration of ions in the solution. Assuming that somewhere between epidermis and central cylinder of the host plant there is a layer of cells having an ionic concentration sufficient to cause the hyphae to curl, branch, or break down, it is suggested that phagocytosis would tend to occur in such a region.

Hatch (W. R.) & Jones (R. C.). **An experimental study of alternation of generation in Allomyces arbusculus.**—*Mycologia*, xxxvi, 4, pp. 369–381, 1944.

Studies on *Allomyces arbusculus*, North Carolina strain, showed that when resistant sporangia are air-dried for 24 days, the products are exclusively sexual, this condition remaining unchanged when the resistant sporangia are brought to dehiscence in rich nutrient. The products of resistant sporangia dried for 18 days are predominantly sexual, but not exclusively so when cultured in rich nutrient. The products of resistant sporangia dried for 12 days are predominantly asexual in rich nutrient; the products of resistant sporangia dried for six days are predominantly asexual in rich nutrient, and produce some asexual plants in weak nutrient. It is concluded that drying and nutrition affect the sexual–asexual ratio of the products of resistant sporangia.

Saksena (R. K.) & Bhargava (K. S.). **Nitrogen requirements and vitamin deficiencies of Phytophthora phaseoli Thaxter.**—*Proc. Indian Acad. Sci.*, xviii, 2, pp. 45–51, 1 fig., 1943.

In the writers' experiments at the University of Allahabad, a culture of *Phytophthora phaseoli* from the Centraalbureau voor Schimmelcultures, Baarn, Holland, made no growth on a medium consisting of mineral salts, dextrose, and inorganic nitrogen, but required a special amino acid (*d*-alanine), supplemented by thiamin. Other substances providing nitrogen in a suitable form included peptone, hydrolysed peptone, casein, buttermilk, lentil or yeast extracts, and Lima bean [*Phaseolus lunatus*] infusion, all of which, except casein, also supply the necessary growth substance.

Stapp (C.). **Über serologische Virusforschung und den diagnostischen Wert serologischer Methoden zum Nachweis der pflanzlichen, inbesondere der am Kartoffelabbau beteiligten Viren.** [On serological virus research and the diagnostic value of serological methods for the detection of plant viruses, especially those concerned in Potato degeneration.]—*J. Landw.*, lxxxix, 3, pp. 161–188, 1943. [Abs. in *Exp. Sta. Rec.*, xci, 2, p. 163, 1944.]

The aspects of serological research discussed in this comprehensive survey include antigens, animal experiments, the preliminary treatment and titre determination of antisera, differential serological methods, e.g., agglutination, complement-fixation reaction, conglutination, and various precipitin and microprecipitin techniques, the adaptability of serological procedures to virus demonstration, and their limitations in the detection of plant viruses, especially those implicated in potato degeneration.

Bald (J. G.). **Transmission of Potato virus diseases. 4. Ground work studies on the growth of normal Potato foliage.**—*J. Coun. sci. industr. Res. Aust.*, xvii, 2, pp. 94–111, 3 graphs, 1944.

To obtain ancillary information useful in the study of potato virus diseases the author made periodical measurements of leaf area on potato plants of different varieties and strains during their earlier stages of development. The data obtained showed that the main determinant of maturity was the growth rate of the axillary shoots. Independently of varietal differences in the time of inception of axillary growth, early-maturing strains and varieties had a relatively slow axillary growth rate, while late-maturing strains and varieties had a relatively fast one.

Samuel (G.). **Some factors affecting the yield of the Potato crop.**—*J. R. Soc. Arts*, xcii, 4675, pp. 562–573, 1 map, 1944.

This stimulating discussion of the various factors influencing potato yields in the United Kingdom, presented at a meeting of the Royal Society of Arts on

26th April, 1944, contains a number of references to phytopathological matters, including the losses incurred through viruses, potato blight [*Phytophthora infestans*], and dry rot [*Fusarium coeruleum*], the present position in regard to seed potato certification, and other points of special interest to plant-breeders. The paper was followed by a discussion.

Delaney (D.) & Keenan (P.). **The building up and maintenance of healthy stocks of seed Potatoes. A review of the work.**—*J. Dep. Agric. Éire*, xli. 1, pp. 95–105, 1944.

This is a report on the progress made to date in the development and maintenance of healthy seed potato stocks in Éire. The methods employed for the object in view include regular periodic inspection by whole-time officers; elimination of diseased plants by roguing; strict regard to varietal purity; the building-up of seed stocks in the bleak, cold, wind-swept region of Co. Donegal, where the climatic conditions are unfavourable to *Myzus persicae*, the chief aphid vector of potato viruses; and the isolation of 'nucleus stocks' on land that has been several years under grass at a minimum distance of 100 yds. from other potatoes. Very satisfactory stocks of Arran Pilot and Arran Banner, for instance, are now available for greater distribution, and a gradual improvement is being effected in the health of other varieties, e.g., Kerr's Pink and Arran Victory. Particulars are given of the conditions governing the issue of certificates in respect of approved stocks.

Ruehle (G. D.). **Outstanding Potato late blight control in Florida with a new organic fungicide combined with zinc sulfate.** -*Plant Dis. Reptr*, xxviii, 7, pp. 242–245, 1944. [Mimeographed.]

Outstanding control of potato late blight (*Phytophthora infestans*) was obtained in experimental plots in Dade County, Florida, during the 1943 4 season with disodium ethylene bisdithiocarbamate [*R.A.M.*, xxiii, p. 115] (manufactured by the Rohm and Haas Company under the code number He 175) used in combination with zinc sulphate and lime. In the first test, spraying with a knapsack sprayer at three- to eight-day intervals for a total of nine applications with He 175 alone, at the strength of 2 lb. in 100 gals., gave 163·7 bush. per acre and 76·7 per cent. U.S. No. 1 tubers; at 4 100, 186·5 bush. and 78·9 per cent.; He 175 plus zinc sulphate and lime at 2–1–½-100, 325·4 bush. and 90·8 per cent.; and the same combination at 4–1–½-100, 381·4 bush. and 93·4 per cent., whereas the figures for the untreated control were 93·8 bush. and 54·3 per cent. The increases in yield obtained from the combination are considered highly significant, and not accounted for by zinc stimulation or reduction of run-off. Spraying with He 175 plus zinc sulphate without lime caused some foliage injury late in the season and is considered unsafe. The application of He 175 in dust form proved inferior to its use as a wet spray. In a second test, spraying with a tractor-drawn power sprayer at 400 lb. pressure at six- to seven-day intervals for a total of seven applications again gave the best results with He 175 plus zinc sulphate and lime (1½ 2 1–100) which yielded 304 bush. per acre with 293 bush. per acre of U.S. No. 1 tubers, and 6 per cent. of foliage killed by late blight 70 days after planting. The corresponding figures for the untreated control were 48, 34, and 78, respectively, and for the other fungicides tested (copper-hydro with and without zinc sulphate and lime, cuprocide with either zinc or copper sulphate and lime) between 180 and 203, 125 and 191, and 19 and 32, respectively.

Nattrass (R. M.). **Potato blight.**—*E. Afr. agric. J.*, x, 1, pp. 18–21, 1944.

Potato blight (*Phytophthora infestans*) has been present in East Africa since 1941, and must now be regarded as an endemic disease. While all authorities are

agreed that the minimum temperature required for the rapid establishment of foliar infection is about 50° F., little information is available concerning the upper limit. In Kenya [*R.A.M.*, xxi, p. 426], with a daily variation of 20° or more, nocturnal conditions may favour the spread of the fungus and those prevailing during the day retard its development, though it is doubtful whether an upper limit of 78°, given plentiful moisture, would exert any inhibitory action. The pathogen is probably perpetuated on the diseased plants which may be observed on native holdings right up to the forest line in the Kenya Highlands, while many small infected tubers survive lengthy dry periods underground and produce blighted sprouts on the development of humid conditions. Full directions are given for the control of the disease by spraying with Bordeaux or Burgundy mixture or a reliable proprietary copper fungicide, e.g., perenox, coppesan, oxycop, and bouisol, beginning when the plants reach a height of 6 to 8 in., and continuing at 10- to 21-day intervals, a total of three applications being ordinarily adequate.

Thomas (W. D.). **Late blight of Potatoes from 'healthy' tubers.**—*Plant Dis. Reptr*, xxviii, 11, p. 399, 1944. [Mimeographed.]

In the course of experiments at St. Paul, Minnesota, in 1943 on the epidemiology of potato late blight (*Phytophthora infestans*), 39 externally sound tubers were treated with 1 in 1,000 mercuric chloride and planted in sterile soil, the emerging sprouts being covered with Mason jars to provide a humid atmosphere for the development of the fungus, if present, as well as to exclude extraneous contamination. The disease appeared at the tips of the first leaves from 20 of the tubers, and the examination of sections of the sprouts revealed non-septate hyphae throughout the phloem.

In the field, nine out of 600 hills from apparently healthy tubers (originating, however, in a contaminated seed stock) also produced blighted shoots. During the period between emergence and the appearance of symptoms on the sprouts, no spores of *P. infestans* were trapped on the vaseline-coated slides exposed daily in the experimental plot, though many were caught after conidiophores and conidia began to form on the host. These observations denote that apparently sound tubers from an infected seed stock may harbour the pathogen in a latent form.

Dillon Weston (W. A. R.) & Taylor (R. E.). **Development of mould on the cut surfaces of Potato tubers.** —*J. agric. Sci.*, xxxiv, 2, pp. 93-96, 1944.

Continuing their experiments [*R.A.M.*, xxii, p. 190], the authors found that when potato cut surfaces were treated with Bordeaux and Burgundy mixtures, only slight growth of *Penicillium* sp. developed, but when the copper sulphate constituent was used separately severe contamination resulted. No growth occurred on control setts or those treated with lime water or the sodium carbonate constituent. Zinc oxide did not appear to affect suberization, and no mould growth was associated with its use. Evidence is adduced to show that the stimulation of mould growth was associated with this metallic radical and most salts of cobalt, nickel, and iron induced similar results to the copper, whereas other salts induced no such reaction, and manganese-treated tubers remained entirely free from mould.

Other experimental data indicate that the development of *P.* on potato tubers following treatment with copper salts is greater than may be explained solely on the basis of saprophyte growth following phytocidal action and the prevention of suberization. For example, delay in treating setts until the cut surfaces had suberized did not prevent the growth of *P.*, and furthermore, much sparser fungal growth occurred on tissues killed by heat than by copper salts. Under moist conditions, treatment of non-living substrates, such as straw, leather, and skin,

with copper sulphate suppresses or inhibits moulds and bacteria, possibly owing to failure by the substratum to immobilize the toxic copper and reduce toxicity, as appears to occur when living vegetable tissues are so treated.

HARTER (L. L.). **Sweetpotato diseases.**—*Farms' Bull. U.S. Dep. Agric.* 1059, 26 pp., 20 figs., 1944.

This useful bulletin (originally published in 1919 and revised in 1928) summarizes the information available to date on the symptomatology, etiology, distribution, economic importance, and control of sweet potato field and storage diseases [cf. *R.A.M.*, viii, p. 665]. Black rot (*Ceratostomella fimbriata*) is probably responsible for as much loss as all the other diseases combined.

JODON (N. E.), RYKER (T. C.), & CHILTON (S. J. P.). **Inheritance of reaction to physiologic races of Cercospora oryzae in Rice.** –*J. Amer. Soc. Agron.*, xxxvi, 6, pp. 497–507, 1944.

A tabulated account is given of genetic studies on the F_2 and F_3 populations of 48 crosses between rice varieties resistant, moderately resistant, and susceptible to leaf spot (*Cercospora oryzae*) physiologic races 1, 2, 3, and 4, grown at two localities in Louisiana and one in Texas from 1940 to 1943, inclusive [*R.A.M.*, xxii, p. 224]. Thirty-five F_2 crosses gave single- and 13 duplicate-factor segregations for resistance or moderate resistance versus susceptibility, comparable results being also given in a limited number of experiments with the F_3 and backcrosses. As many as three, if not more, duplicate factors may operate for resistance to a single race. One cross (susceptible Blue Rose × resistant Rexoro) segregated for resistance, moderate resistance, and susceptibility in a 12 : 3 : 1 ratio.

LE BEAU (F. J.). **Phymatotrichum root rot on Cryptostegia grandiflora, with notes on its distribution in Mexico.**—*Plant Dis. Reptr*, xxvii, 15, pp. 278–280, 1 map, 1943. [Mimeographed.]

Surveys made from February to May, 1943, in the State of Tamaulipas, Mexico, showed that the most prevalent disease of the rubber plant *Cryptostegia grandiflora* was *Phymatotrichum* root rot [*P. omnivorum*]. The disease was present in many localities where this host was growing as an escape, and was also found on six-months-old seedlings under cultivation. Heavily infected soil should be avoided in selecting areas for extensive plantings of *C. grandiflora*.

The disease was found on various hosts in 13 separate localities between San Fernando, about 100 miles south of Brownsville, Texas, and the northern corner of the state of Vera Cruz. A very extensive and heavily infected area was encountered in the prairie region in the vicinity of Manuel and Gonzalez, Tamaulipas, where several hundred acres of castor bean [*Ricinus communis*], stated to have been planted on virgin soil, were severely affected. South-west of Manuel, an area of heavy infection was found in several thousand acres of prairie being ploughed up for the first time. The disease was also found on cotton in close proximity to *C. grandiflora* near Culiacan, Sinaloa, in western Mexico.

WAKSMAN (S. A.). **Three decades with soil fungi.** - *Soil Sci.*, lviii, 2, pp. 89–114, 1944.

This is a summary of the results of investigations carried out at the New Jersey Agricultural Experiment Station during the last thirty years on the subject of fungi (excluding Actinomycetes) in relation to soil processes. The bibliography comprises over 160 titles, the majority referring to papers by the author and his collaborators published from the Station.

Chowdhury (S.). **A sclerotial disease of Black Pepper.**—*Indian J. agric. Sci.*, xiii, 5, p. 566, 1943.

A severe basal wilt disease of black pepper (*Piper nigrum*), causing losses of up to 67 per cent. in some Assam plantations, was observed in January, 1943, and found to be due to *Sclerotium rolfsii*, not hitherto recorded on this host in India. The pathogen was isolated on oat agar slants and inoculated into pepper plants with positive results.

McMartin (A.). **Pineapple disease of Sugarcane cuttings and its control.**—*S. Afr. Sug. J.*, xxviii, 6, pp. 241, 243, 245, 1944.

Pineapple disease (*Ceratostomella paradoxa*), first recognized in Natal by the writer in 1935 [*R.A.M.*, xiv, p. 470], is thought to be the predominating single cause of germination failure among sugar-cane cuttings, especially of the susceptible Co. 331, 301, and 281 varieties. The fungus is carried on the exterior of the cane used for planting and enters the sticks when they are cut in pieces, causing decay of the latter under conditions conducive to slow germination. Satisfactory control was obtained in a field experiment in 1943 by cutting the cane (Co. 331) into lengths before planting in July, dipping the cut ends into containers in the bottom of which agrosan, ceresan, or thiosan dust was sprinkled. The cuttings were planted at the rate of 100 each in $\frac{1}{48}$ acre plots, and four replications were made of each of the treatments, arranged as a 4×4 Latin square. On 1st December, the number of buds grown in the control, agrosan, ceresan, and thiosan plots were 9, 22, 24, and 17 per cent., respectively; the number of cuttings germinated were 24, 57, 56, and 44 per cent., respectively; and the number of cuttings showing positive evidence of pineapple disease 45, 1·5, 3·5, and 9 per cent., respectively.

Forbes (I. L.), Mills (P. J.), & Dunckelman (P. H.). **Red rot in windrowed Sugar Cane.**—*Sug. Bull., N.O.*, xxii, 18, pp. 148–149, 1944. [Abs. in *Sugar*, xxxix, 8, p. 45, 1944.]

When the autumn planting season in Louisiana is abnormally wet and operations have to be deferred until the spring, use must be made of seed cane that has been overwintered in windrows. This is effected by placing the cane stalks, with adhering leaves and tops, in the middles of the cane rows and covering them with two furrows of a farming plough. The examination for red rot [*Colletotrichum falcatum*] of a number of varieties treated in this manner showed the C.P. varieties 29 120, 33 310, and 29 103 to be almost perfect windrowing canes for seed purposes; 26/116, 33/425, 29/230, and 36/105 are also satisfactory; and 33/243 and 34/20 are susceptible to the disease.

Abbott (E. V.) & Summers (E. M.). **Disease testing and initial seedling resistance at Houma in 1943.**—*Sug. Bull., N.O.*, xxii, 18, pp. 144–148, 1944. [Abs. in *Sugar*, xxxix, 8, pp. 43–44, 1944.]

Since 1935 the three outstanding problems in cane variety selection in Louisiana have been (1) to obtain a satisfactory substitute for Co. 281 for windrowing; (2) to secure earlier maturing varieties suited to heavy and mixed soils; and (3) to replace C.P. 28/19 by an equally precocious cane of a superior type and less expensive to harvest. In each of these projects the question of disease resistance was an important consideration. Progress towards the first of the three objectives has been made with the release of C.P. 34 120, which will yield a higher sugar tonnage when windrowed than Co. 281 and is less susceptible to mosaic and root rot, though far more so to chlorotic streak [*R.A.M.*, xxii, p. 39]. The former selection is also a contribution to the second project, provided particular care is taken to keep seed supplies free from chlorotic streak, which is usually more prevalent on heavy soils. C.P. 34/120 can further be used to a limited extent for

early milling. A great obstacle to the realization of the third of the above-mentioned objectives lies in the fact that a majority of seedlings with a high sucrose content are either low in vigour, of poor type, or susceptible to one or more of the major diseases. Hitherto the only new seedling that has maintained an average sucrose level equal to that of C.P. 28/19 is C.P. 36/62, which stubbles so poorly, however, as probably to be excluded from consideration as a commercial cane. The use of the other most likely selection, C.P. 32 253, appears to be restricted to muck soils where there is no fear of the spread of mosaic.

Zundel (G. L.). **Notes on the Ustilaginales of the world. IV.** *Mycologia*, xxxvi. 4, pp. 400–412, 1944.

This further instalment of the author's annotated list of smuts newly described or newly recorded from different parts of the world [*R.A.M.*, xxii, p. 454] includes *Ustilago cynodontis* on *Cynodon dactylon* from Tanganyika Territory, *Sphacelotheca cruenta* on sorghum from Chenkung, Yunnan, China, *Sorosporium reilianum* on sorghum from Kweichow, China, and *Urocystis tritici* on *Triticum* sp. cult. from Cauquenes, Chile.

Malik (S. A.) & Khan (M. A.). **Parasitic fungi of the North-West Frontier Province.**—*Indian J. agric. Sci.*, xiii, 5, pp. 522–527, 1943.

A list is given of 105 fungal pathogens of plants collected, mostly by the senior author, in the North-West Frontier Province during the last five years. Among the records listed may be mentioned *Fusarium orthoceras* var. *ciceris* [*R.A.M.*, xxiii, p. 325] on *Cicer arietinum*, *Piricularia oryzae* on wheat, *Cronartium ribicola* and *Puccinia ribis* on red currant, *P. coronata* on *Rhamnus dahuricus*, and *F. udum* var. *crotalariae* on *Crotalaria juncea*.

Wallace (G. B.) & Wallace (M[aud] M.). **Supplement to the revised list of plant diseases in Tanganyika Territory.** *E. Afr. agric. J.*, x, 1, pp. 47–49, 1944.

Further records are listed of plant diseases in Tanganyika Territory since the publication of the revised list in 1937 [*R.A.M.*, xvi, p. 410].

Graham (V. O.). **Mushrooms of the Great Lakes region.** *Spec. Publ. Chicago Acad. Sci.* 5, vii+390 pp., 49 pl., 1944.

The extension of the area covered by W. S. Moffatt's 'Higher Fungi of the Chicago Region' (Part 1, 1909, Part 2, 1923) to include southern Wisconsin, southern Michigan, and the entire States of Illinois, Indiana, and Ohio, has increased the number of woody, leathery, and fleshy fungi involved from 400 to 1,200 in 18 families. The present critically annotated list is supplemented by a key to the genera represented, a dictionary of descriptive terms, and an index.

Godbout (F.). **La rotation, condition essentielle au contrôle de la mosaïque du Tabac jaune.** [Rotation, the essential condition for controlling mosaic in yellow Tobacco.] *Rep. Quebec Soc. Prot. Pl., 1936-1943*, pp. 64–65, [1944.]

After stating that from 1934 [when this crop was first grown locally] to 1936 only a few yellow tobacco plants were affected by mosaic in Montreal (where the growers had been instructed in the usual control methods), the author points out that in 1937 the disease was present in more than half the plantations, i.e., over an area of 363 French acres out of 460. From 1938 to 1940 the losses increased considerably. At present, moderately infected fields are quite common at the start of the season, and by autumn, plantations are commonly found to show 75 per cent. infection. One reason for this situation is that some growers do not practise rotation, and the virus can overwinter in the soil and reinfect the crop the following season. Many growers are unable to practise rotation because they do not possess

enough land, while others find clearing and ploughing up new ground too slow and expensive by routine methods. By the use of a tractor furnished with a bull-grubber new ground is being cleared and confidence is expressed that all growers will soon practise rotation with a consequent reduction in losses from the disease to a minimum.

CLARKE (E. J.). **Studies on Tomato nutrition—I. The effect of varying concentrations of potassium on the growth and yields of Tomato plants.**—*J. Dep. Agric. Éire*, xli, 1, pp. 58–81, 2 pl., 4 graphs, 1944.

The writer's studies at University College, Dublin, in 1941 and 1942, on the effect of varying supplies of potassium sulphate on the growth and yields of Potentate tomatoes afforded no evidence of any consistent connexion between the amount of this element present in the plants and blotchy ripening [*R.A.M.*, xvii, p. 777]. An increase in the incidence of blossom-end rot and chlorosis, however, was apparent at the higher levels of potassium manuring, e.g., $\frac{3}{4}$ or 1 oz. per plant per application as a base, and $\frac{3}{8}$ or $\frac{1}{2}$ oz. as a top dressing, while *Botrytis* [*cinerea*] was favoured by a deficiency of the mineral, which further enhanced the susceptibility of the plants to low-temperature injury.

The symptoms of potash deficiency in these investigations differed somewhat from those described by other workers, and included a darkening of the foliage (not always a constant feature), a yellow-green pallor of the tips of the distal leaflets, gradually spreading to the entire leaf, and a brittle, papery texture and grey-brown marginal scorching of the affected upturned leaflets. These manifestations were sometimes, but not invariably, preceded by a peppering of the leaves with small, reddish-brown spots.

LEACH (J. G.) & BERG (A.). **Successful control of tip blight of Tomato.**—*Plant Dis. Reptr*, xxvii, 21, p. 590, 1943. [Mimeographed.]

The virus of tip blight [a strain of spotted wilt] of tomato, which occurred in epidemic form at Morgantown, West Virginia, in 1942 [*R.A.M.*, xxii, p. 502] and had caused over 50 per cent. reduction in the crop for two successive years, was found to be transmitted by *Thrips tabaci*, an insect harboured by the weed *Galinsoga parviflora* in addition to tomato, chilli, and numerous ornamentals. Excellent control was obtained by thorough eradication of weeds in and near the greenhouse, reduction of the number of plants in late summer to the minimum required for propagation, and a spraying programme consisting of alternate applications of a proprietary contact insecticide (Loro) and the standard tartar emetic solution: during the autumn and winter the treatments were given fortnightly, but after planting out in the early spring the young tomato and chilli plants were sprayed alternately with the two preparations at intervals of one week or less.

WHITE (N. H.). **Virus diseases of Tomatoes.**—*Tasm. J. Agric.*, xv, 2, pp. 37–44, 10 figs., 1944.

Brief, popular notes are given on the symptoms, causes, and control of the chief virus diseases of tomatoes in Tasmania. The most frequent of these, and the most damaging, is spotted wilt, though fern leaf, streak, and big bud are also present. The paper concludes with a short list of other virus diseases occurring on tomato.

SEAVER (F. J.). **The horse-hair fungi.**—*Mycologia*, xxxvi, 4, pp. 340–342, 1 fig., 1944.

In December, 1943, horse-hair blight was found on scrub oak [*Quercus ilicifolia*] in Louisiana, the strands being at first mistaken for spiders' webs. As far as is known, the fungus represents the mycelial stage of a *Marasmius*, based on material

collected in Australia and described by Kalchbrenner as *M. crinis-equi* (*Grevillea*, viii, p. 153, 1879). Berkeley (*J. Linn. Soc. Lond.*, xviii, p. 383, 1883) changed the spelling to '*equicrinis*', but the author considers that the original spelling should be retained. The American material agreed closely with Petch's description of the type species (*Ann. R. bot. Gdns Peradeniya*, vi, pp. 43–44, 1915). Only one previous collection appears to have been reported from continental North America.

Ezekiel (W. N.), Nelson (C.), & Mueller (E. R.). **Sclerotium rolfsii seedling blight of Walnut, Catalpa, and Russian Olive.** —*Plant. Dis. Reptr*, xxvii, 23, pp. 636–637, 1943. [Mimeographed.]

At a nursery of the Texas Forest Service situated in a region where *Sclerotium rolfsii* is prevalent on tomatoes and other plants, the same fungus has been found killing black walnut [*R.A.M.*, xx, p. 614], *Catalpa speciosa*, and *Elaeagnus angustifolia* seedlings, from all of which it was readily isolated in pure culture. In *C. speciosa* the disease assumed the form of a typical post-emergence damping-off, the stems collapsing just above the ground and a straw-coloured to deep brown, sharply constricted lesion extending to about 2 cm. above the crown. On *E. angustifolia* the crown lesions were of a conspicuously dark reddish-brown colour and extended up the stem for a distance of up to 3 cm. Some 25 plants were killed, mostly in groups of two to four. The sclerotia produced in culture by isolates of *S. rolfsii* from *E. angustifolia* were brown, spherical to slightly elongated, averaging 1 mm. or less in diameter, with a maximum of 1·4 to 1·5 mm.

Dodge (B. O.). **Volutella buxi and Verticillium buxi.**—*Mycologia*, xxxvi, 4, pp. 416–425, 1944.

After referring to the fact that when a branch of blighted dwarf English boxwood [*Buxus sempervirens*] bearing leaves infected with *Hyponectria buxi* was placed in a damp chamber, *Verticillium buxi* and *Volutella* [*Chaetodochium*] *buxi* [*R.A.M.*, xii, p. 634; xxiii, p. 320] often developed, the author presents detailed evidence in confirmation of Juel's view (Mykol. Beitr., IX, *Ark. Bot.*, xix, pp. 1–10, 1925) that these two organisms are distinct.

In *Verticillium buxi* the sporophores are generally snow-white and evenly scattered over the under sides of the leaves. The conidia germinate slowly on potato dextrose agar, and mycelial growth is also very slow. The mycelial mat is tough. The first aerial growth consists of whitish, erect branches, while later growth is zonate, some zones being light pink to rose or peach. Old plate cultures are deep rose. The spores are broadly spindle-shaped and pointed at the ends, and are held together in long, white chains. In very moist conditions the conidia mass together and become slightly roseate. On potato dextrose agar in old cultures the conidial masses are deeply roseate. Infection experiments with living plants proved that the fungus is not a primary leaf blight, infecting living leaves under bell jars only with difficulty.

While the feature that distinguishes a *Volutella* from related genera is the presence of setae round the margin of the sporodochium, many sporodochia of *C. buxi* have none. The sporodochia may arise beneath the epidermis, emerging as whitish, later roseate or coral pads. They often develop on short stalks composed of compacted mycelial growths which have come through stomatal openings. The setae are short and coarse, and have blunt ends. They arise from the base of the fruiting structure, and grow up round the margin. A characteristic mark is the ruby-red drops of sticky substance at the tips, which harden on drying, but readily dissolve in water, so that both in nature and in herbarium specimens the hairs may not show the red heads. The conidia germinate quickly on potato dextrose agar, the mycelium growing about five times as fast as does that of *Verticillium buxi*. The hyphae are also coarser. Growth is whitish, becoming light

pink or dull peach. In plate culture it is dappled, and the mat is not leathery. The conidia resemble those of *V. buxi* in shape and size, but are more rounded or elliptical and vary greatly in size. As the conidia develop, they are held in a drop of clear, watery substance.

When living boxwood plants were sprayed with a conidial suspension of *C. buxi* and kept under bell jars, numerous leaves became infected within a week, but no sporophores of *V. buxi* developed.

In agreement with earlier authors Juel referred the perfect stage of the *Volutella* to *Nectriella rousseliana*, but believed the perfect stage of *C. buxi* to be an undescribed species of *Nectriella* which he named *N. coronata*.

Ascocarps developed on the author's material. Along with *C. buxi* and *Verticillium buxi* there appeared chlorophyll-green fruiting bodies about the size and shape of a *Nectriella*. As they enlarged, they developed stiff hairs over the surface. The perithecia resembled the one figured by Juel for *N. rousseliana*, except that in the author's specimens the hairs were always capped with bright ruby-red heads. These setae resembled those on the sporodochia of *C. buxi*, but were thicker, stiffer, and, occasionally, more numerous. As the perithecia developed, the chlorophyll-green changed to black-green and then to amber brown. Nearly all these ascocarps collapsed without showing any asci or spores which could be determined as ascospores. *N. rousseliana* var. *viridis* Berk. & Br. 1859 differed from the original species only in the green colour of the perithecia.

The real *V. buxi* looks like a white *Penicillium*. It is probably safe to conclude that when *P. roseum* has been reported on boxwood either *V. buxi* or *C. buxi* was present, or they both were.

Rhoads (A. S.). **Diseases affecting Tungoil plantations in Florida.**—*Plant Dis. Reptr*, xxvii, 19, pp. 484–486, 1943. [Mimeographed.]

Details are given of destructive outbreaks of root rot [*Clitocybe tabescens*] in tung oil (*Aleurites fordii*) plantations in various parts of Florida [*R.A.M.*, xxi, p. 497], especially on land bearing numerous oaks prior to clearing. A serious feature of the disease is its tendency to escape notice until an advanced stage of infection is reached and the trees can no longer be saved. The fungus usually invades the root system extensively before spreading far enough upwards on the root crown to kill the bark at the base of the tree. A gummy degeneration of the tissues stimulated by the advancing mycelial sheets may be expressed by the formation of short longitudinal fissures in the living cortex, through which masses of gum exude and harden on exposure to the air. The death of patches of bark at the tree base is commonly accompanied by blackening of the tissues, which emit a noxious odour. Bark beetles frequently attack trees in this declining condition, and the sifting-out of sawdust through the minute holes made by the insects may be a sign of the final phase of infection by *C. tabescens*. The wood of the larger roots and butts is deeply penetrated by the fungus, which induces a white rot of the delignifying type and causes the formation of radial cracks filled with whitish xylostroma.

Among other new hosts of *C. tabescens* may be mentioned *Tibouchina glandulosa*, *Grewia* (?) *occidentalis*, *Ficus* sp., *Casuarina lepidophloia*, sand pear (*Pyrus pirifolia*), camphor, deodar, and privet (*Ligustrum lucidum*).

A severe outbreak of thread blight, *Corticium stevensii* (= *Pellicularia* [*C.*] *koleroga*) [ibid., xxii, p. 372], accompanied the root rot over an area of 130 acres on low-lying land where the closely spaced trees were unduly crowded and shaded. The former disease spreads rapidly during the warm, humid summer weather, causing heavy defoliation and death of the leaves, twigs, and branches. Pruning appears to be ineffectual against *C. koleroga*, which may, however, be combated by spraying.

Wagener (W. W.) & Cave (Marion S.). **Phytophthora canker of Madrone in California.** —*Plant Dis. Reptr.* xxviii, 9, p. 328, 1944. [Mimeographed.]

Phytophthora cactorum was isolated in August, 1943, from the margins of basal cankers on Pacific madrones (*Arbutus menziesii*) [*R.A.M.*, xxii, p. 459] near the Grass Valley, California. The fungus was observed to be proceeding up the trunk in the form of bluntly wedge-shaped extensions of the dead areas. Attempts at the isolation of the pathogen in the following November gave negative results, indicating the quiescence of the disease under local conditions during the autumn.

Siggers (P. V.). **The brown spot needle blight of Pine seedlings.** *Tech. Bull. U.S. Dep. Agric.* 870, 36 pp., 2 pl., 2 graphs, 1944.

Brown spot needle blight (*Scirrhia acicola*) [*R.A.M.*, xix, p. 248] constitutes one of the most serious impediments to increased production of southern longleaf pine (*Pinus palustris*), which furnishes 40 per cent. of the American supply of turpentine and rosin, makes up a large proportion of the total annual cut of southern yellow pine, and, by reason of its long fibre, is well adapted for paper pulp.

Some of the information presented in this summarized report of studies, which have been in progress since 1929, on the various aspects of the disease is already covered by previous contributions [ibid., xx, p. 186], but the following important facts may be noted. *S. acicola* has been observed in all the coastal States from North Carolina to Texas, and inland in Arkansas, Tennessee, and Ohio, while a single collection has also been made in Oregon on *P. attenuata*. Of the 24 pine species or varieties attacked, ten are native to the south-east and 14 occur as exotics in the east; the former group includes *P. caribaea*, *P. glabra*, *P. rigida*, *P. strobus*, *P. taeda*, and *P. virginiana*, and the latter *P. coulteri*, *P. halepensis*, *P. latifolia*, *P. nigra* [var.] *poiretiana*, *P. pinaster*, *P. pinea*, two varieties of *P. ponderosa*, *P. radiata*, *P. sabiniana*, and *P. thunbergii*.

Under dry conditions in the laboratory (temperature 60° to 93° F. and atmospheric humidity 25 to 90 per cent.), the conidia of *S. acicola* from fruit bodies on *P. thunbergii* needles from Florida soon began to lose their germinative capacity, and 24 days after collection the germination percentage was only 11 compared with 83 for a corresponding series kept in a refrigerator at 5° to 15° C. and 80 per cent. humidity. The upper thermal limit for germination lay at about 35° and the lower between 5° and 10°, while the minimum, optimum, and maximum growth temperatures were found to be slightly below 5°, just above 25°, and 35°, respectively. The alkaline and acid limits for germination occurred between P_H 8·3 and 8·9 and below 4·3, respectively. The average diameter of nine conidial isolates after a fortnight's growth on potato dextrose agar was 2·65 mm., or approximately the size of single macular lesions on *P. palustris* needles. A minimum period of 14 days was requisite for the development of viable conidia in monospore cultures.

Local dissemination of the conidia was experimentally shown to be effected by the splashing of rain, whereas air currents are largely responsible for the dispersal of the ascospores. These organs are only formed on *P. palustris* after the death of most of the needle, and are the origin of a general but low-degree infection commonly appearing in the spring on the foliage of seedlings shortly after a winter fire.

The dwarfing effect of brown spot on the early growth rate of seedling *P. palustris* stands was studied under natural conditions by controlling the disease with fungicides over a protracted period and comparing the subsequent development of the plants in the treated and adjacent unsprayed rows. In Washington Parish, Louisiana, the height increment of one stand has already been delayed by over ten years. In a second plantation, the average heights of the sprayed and untreated

seedlings at the end of the eighth season in the field were 11 ft. 2 in. and 1 ft. 1 in., respectively. In central Louisiana, the average height of a lot of seedlings sprayed four times in five years was more than double that of the untreated seedlings in the same four-year-old plantation. Complete defoliation as a seasonal pathological process retarded the annual height growth in the next season to one-seventh or less of that of sprayed healthy seedlings in adjoining rows. At least three successive annual defoliations were necessary to weaken the seedlings sufficiently to cause death, which assumes the form of an attrition process that may continue unnoticed for years. By retarding rapid growth in height for upwards of a decade, *S. acicola* contributes indirectly to low survival, though other factors may be the immediate cause of mortality.

The growth capacity of stunted, diseased longleaf pines can be promoted by heavy applications (of the order of 3,400 lb. per acre) of a 3–10–3 fertilizer, but neither soil amendments nor spraying, except under nursery conditions, appear to be economically feasible as control measures against brown spot. The minimum spray schedule needed to guarantee a satisfactory sapling stand—two semi-annual treatments applied during each of the first two seasons in the field—would increase the cost of a plantation by at least $4 per acre. It is concluded that the periodic use of fire is the rational procedure where the disease is serious on reproduction areas.

Erdtman (H.) & Rennerfelt (E.). **Der Gehalt des Kiefernkernholzes an Pinosylvin-Phenolen. Ihre quantitative Bestimmung und ihre hemmende Wirkung gegen Angriff verschiedener Fäulpilze.** [The pinosylvin phenol content of Pine heartwood. Its quantitative determination and its inhibitory action on infection by various rot fungi.]—*Svensk Papptidn.*, xlvii, 3, pp. 45–56, 12 figs. (9 col.), 1 diag., 1944. [Swedish and English summaries.]

A method for the quantitative determination of pinosylvin and pinosylvin monomethyl ether in pine heartwood [see above, p. 465] has been worked out. Extracts of the wood are purified until mainly phenolic constituents remain. The pinosylvin phenols, when oxidized with potassium permanganate, yield benzoic acid, which is readily estimated. The red coloration of the heartwood caused by bisdiazotized benzidin runs parallel with the pinosylvin phenol content, thus affording a basis for colorimetric procedures. The amount of pinosylvin is higher at the butt (over 1 per cent.) and in the branches (up to 3 per cent.) than in the trunk, and the periphery of the heartwood usually contains more (sometimes five or six times) than the centre, in which connexion it is of interest to note the preference of wood-destroying fungi for the latter region.

In experiments to ascertain the relative capacity of different wood-destroying fungi to attack the sap- and heartwood of 50-, 100-, and 150-year-old pine blocks, *Lentinus squamosus* was almost as destructive to the former as to the latter, causing 35·3, 29·7, and 28·6 per cent. loss of weight, respectively, in the heartwood of the three age groups compared with 34·7, 34·5, and 34·9 in the sapwood. The corresponding figures for *C. cerebella* [*C. puteana*] were 5 and 28·8, 21 and 29, and 24·4 and 31·6 in the 50-, 100-, and 150-year groups, respectively, and for *Polyporus vaporarius* [*Poria vaporaria*], 3·9 and 45·7, 21·6 and 38·6, and 15·7 and 31·7, respectively. In another test on 200-year-old blocks, *L. squamosus* again caused almost as extensive disorganization of the heartwood as of the sapwood, the loss of weight in blocks taken from the tree at a height of 1 in. above the ground being 20·2 and 25·4 per cent. in the peripheral and central heartwood, respectively, and 25·6 in the sapwood, while the corresponding figures for blocks from a height of 7 in. were 25·2, 25·2, and 28·8, respectively. In the blocks 1 in. above ground, *C. puteana* destroyed 16·7, 22·7, and 21·3 per cent. of the peripheral and central heartwood and sapwood, respectively, the corresponding figures for *P. vaporaria*

being 1·4, 37·9, and 30·4, respectively; in the 7 in. series, the losses due to *C. puteana* in the three regions of the wood were 21·2, 24·6, and 24·9 per cent., respectively, and to *P. vaporaria*, 9·8, 33·5, and 31·5, respectively.

No explanation can yet be offered of the remarkable anomalies between the aggressive behaviour of these fungi in nature and their collapse in the presence of the pinosylvin phenols in culture.

Mook (P. V.) & Verrall (A. F.). **Recent tests on sap-stain control.** *Sth. Lumberm.*, clxix, 2118, pp. 59–61, 1944.

In further tests on sap-stain [*Ceratostomella* spp. and other fungi] and mould (*Trichoderma* and *Penicillium*) control [cf. *R.A.M.*, xx, p. 388] on southern yellow pine [*Pinus* spp.], sap gum [*Liquidambar styraciflua*], and yellow poplar [*Liriodendron tulipifera*] timber in Mississippi, Alabama, Louisiana, and North Carolina, the most encouraging results were obtained with mixtures of borax and the phenolic or mercuric compounds widely used for the purpose in view. Two such mixtures are already on the market under the names of permatox 10 S and noxtane. Other effective mixtures consisted of 1 lb. dowicide G, 1 lb. santobrite, or ¾ lb. lignasan with 10 lb. borax, and the triplex combinations of ¼ lb. lignasan, ½ lb. dowicide G, and 6 lb. borax per 50 gals. water. Similar mixtures of dowicide H or P with borax may prove useful for the treatment of hardwoods only.

Ludwigs (K.). & Schmidt (M.). **Die Krankheiten und Schädlinge der Gemüsepflanzen, der Küchenkräuter und wichtigsten Arzneipflanzen. 2 Aufl.** [The diseases and pests of vegetables, pot-herbs, and the most important drug plants. Second Edition.]—190 pp., 11 col. pl., 110 figs., Frankfurt a.d. Oder, Gartenbauverlag Trowitsch u. Sohn, 1942. RM. 6. [Abs. in *Z. PflKrankh.*, liii, 8–12, p. 291, 1943.]

The review by H. Blunck of this manual on vegetable and kitchen-garden plant diseases and pests describes it as successfully reducing, within a narrow compass, a voluminous amount of material, the scope of which fits it to serve as the basis of a text-book, while interest is provided for the expert, too, in the chapter on non-parasitic disorders.

Studies in vegetable seed treatments in 1943. *Plant Dis. Reptr. Suppl.* 145, 97 pp., 2 graphs, 1944. [Mimeographed.]

This supplement is the 1943 report of the Vegetable Seed Treatment Subcommittee of the Seed Treatment Committee to the American Phytopathological Society. It summarizes the tests made by 60 co-operators with 13 vegetable crops in 34 States and 2 Provinces of Canada [cf. *R.A.M.*, xxii, p. 371].

C. M. Haenseler (pp. 7–10), dealing with sweet corn [maize] seed treatments (semesan jr. at the rate of 0·1875 per cent. by weight, arasan 0·0937, 0·1875, and 0·3750 per cent., and spergon 0·937, 0·1875, and 0·375 per cent.), shows that the treated seed gave significantly higher germination rates than the untreated in all but two of 126 comparisons. Arasan and spergon significantly increased germination more often than did semesan jr. used at the same rate. At all three dosages, arasan increased germination rather more often than did spergon. Both gave progressively better protection as the dosage was increased. The greatest number of 'weak' seedlings occurred where the total germination was poorest and vice versa, indicating that greater benefits may be derived from seed treatments than are shown in the total emergence figures ordinarily employed in evaluating seed protectants. Yields were measured in only one test, in which 0·375 per cent. arasan-treated seed gave the highest germination and yield.

G. L. McNew (pp. 11–18) describes experiments in which Thos. Laxton pea seed was treated with spergon, arasan, or fermate at 0·34, 0·17, and 0·08 per cent. The

results demonstrated that all three materials can profitably be used as pea seed treatments. Significantly improved emergence resulted in 69 per cent. of the localities, and yields were increased by an average of 15 to 30 per cent. Of the three materials, spergon was the most consistently beneficial, and gave almost as good results at 0·17 per cent. as it did at double this rate. The other treatments gave the best results at 0·35 per cent.

J. C. Walker and W. W. Hare (pp. 19–21) give the results of Lima bean [*Phaseolus lunatus*] treatments with spergon and fermate at the rates of 0·2 and 0·1 per cent. For practical purposes, the results indicate the use of spergon at the lower, or fermate at the higher rate.

R. H. Porter (pp. 22–25) gives the results of tests with spergon (0·156 per cent.) and arasan, semesan jr., and fermate (0·104 per cent.) with soy-bean. Each treatment significantly increased germination as compared with the controls.

R. H. Porter (pp. 26–30) shows that in 47 tests spinach seed treatment with arasan, fermate, and zinc oxide significantly increased emergence. Data from ten tests showed that the treatments reduced post-emergence damping-off, the most effective in this respect being arasan (1 per cent.), which reduced it by 10 per cent.; the treatments recommended to control seed decay and reduce damping-off being arasan (0·5 per cent.), fermate (0·75 per cent.), or zinc oxide (2 per cent.).

L. D. Leach (pp. 31–35) gives the results of tests in which seed of Detroit Dark Red garden beet was treated with yellow cuprocide, arasan, and ceresan. All three materials appeared to improve emergence. Arasan appeared to be a favourable treatment, a dosage of about 0·5 per cent. being satisfactory.

S. P. Doolittle (pp. 36–38) deals with trials of tomato seed protectants. The treatments used were yellow cuprocide (1·5 per cent.), arasan (0·3 per cent.), spergon (0·3 per cent.), new improved ceresan (five minutes' soak in a 1 in 1,200 dip), and copper sulphate (one hour's soak in a solution of 2 oz. in 2 gals. water). Fifteen trials were made, nine in the greenhouse and six in the field; six of the greenhouse trials were made in soil known to be infected with *Pythium* spp. or artificially infected before planting. All the treatments gave significantly better stands than the controls in three of ten trials, while four of five treatments were effective in three other trials. Copper sulphate soak, yellow cuprocide, and arasan dust seemed slightly superior to the other treatments, but new improved ceresan was quite effective.

A. G. Newhall (pp. 39–45) describes trials against onion smut [*Urocystis cepulae*], in which seed dusting with arasan and fermate (both at 100 and 75 per cent.) was tested against liquid formaldehyde (1 per cent.) and liquid catex (1 and 2 per cent.), the liquids being dripped on to the seed at the rate of 15 c.c. per ft. of row. The results varied with the localities, but appeared to indicate that the best treatment under all conditions was liquid formaldehyde, though in some instances catex was almost as good, and both dusts at the heavier rate of application gave yields equal to those obtained with formaldehyde. In seed treatments against tomato damping-off [ibid., xix, p. 519] thiosan (2 per cent.) appeared to give the best results, followed by fermate (1·5 per cent.), yellow cuprocide (1 per cent.) being a close third.

C. N. Clayton (pp. 46–55) found that the disinfection of seed potatoes is frequently not profitable.

S. P. Doolittle (pp. 58–59) found that the most effective cucumber seed treatment of those tested for improving emergence was arasan (0·3 per cent.).

Two experiments by C. J. Nusbaum (pp. 60–62) indicated that, as regards effect on sprout production, sweet potato seed treatment with fermate 1 lb. plus hydrated lime 1 lb. to 12½ gals. water (instantaneous dip) or borax (1 lb. to 6 gals. water, 10-minute soak) offers a promising substitute for mercurial treatment.

G. Semeniuk (pp. 63–75) describes maize seed treatments against soil-borne

organisms, using semesan jr., barbak D (6 per cent. mercuric phenyl cyanamide), and spergon at the rate of 1½ oz. per bush., and arasan (Du Bay 1205-AL) at the rate of 1 oz. per bush. The experiments were made in eight States on Illinois hybrid 960 and a compounded mixture of seeds of ten commercially grown hybrids. Plantings on different dates were carried out in adjacent areas, and maximum soil temperatures of about 55° F. during spring with accompanying wet conditions appeared to coincide with significant benefits in emergence from seed treatment. Barbak D was generally inferior to the other fungicides. In Minnesota, arasan gave significantly better results than any other treatment. In Missouri, spergon was significantly superior to the other treatments. In Iowa, arasan, spergon, and semesan jr. benefited emergence to about the same degree. In Wisconsin, semesan jr. and arasan were somewhat more effective than spergon. In Illinois, Indiana, and Ohio (26th April planting), spergon and arasan gave the greatest benefit.

Benefits from seed treatment in reducing mesocotyl necrosis were noted for all planting dates in Iowa, where semesan jr. gave the best reduction and barbak D was generally the least effective. Reductions in primary root necrosis appeared significant with semesan jr. in several instances. Similar data on root necrosis in Ohio showed no consistent advantage for any one treatment. No differences in mesocotyl necrosis between semesan jr.-treated and untreated seed were noted in South Dakota.

Isolations from necrotic primary roots in Ohio revealed a species of *Gibberella* affecting many of the roots. In South Dakota, isolations from eight infected mesocotyls yielded *Fusarium* from five, and *Pythium* sp., *P. debaryanum*, and no organism from the remaining three. The Iowa isolations yielded chiefly *F. moniliforme* [*G. fujikuroi*] alone or with *Trichoderma*, and an unidentified chlamydospore-producing organism abundantly present on the roots. A few mesocotyl tissues yielded only *T.* or *Mucor* sp., while one mesocotyl gave *G.* sp. Necrotic primary roots from the first and last dates of planting yielded chiefly *Helminthosporium* sp. and *G. fujikuroi*, while those from the third–fourth dates of planting chiefly gave an unidentified chlamydospore-producing organism followed by *H.* sp. and *G. fujikuroi*. All three fungi were generally associated, with *H.* sp. dominating the association. The chlamydospore-producing organism was much more abundant on plantings of the third–fourth dates than on those of either the first or last dates. *Pythium* and *Rhizoctonia* [*Corticium*] were found mainly on the earlier-planted maize. *Diplodia zeae* was isolated from the primary root of one plant in the early-planted maize.

B. Koehler (pp. 76–79) reports the results of seed treatment tests on oil-type soy-beans with semesan, fermate, new improved ceresan, and spergon. In each plot of two rows, one was inoculated with nodule bacteria before planting and one left uninoculated. In every area except Urbana, Illinois, inoculation was associated with decreased yields, both in the treated and control rows. For all the stations together, every treatment was better than the control, but seed treatment for soy-beans is not at present recommended.

G. L. McNew (pp. 80–91) and W. Crosier and R. H. Porter (pp. 92–97) discuss the treating of seed before distribution.

Gould (C. J.). **Vegetable seed-treatment tests in western Washington, 1943.** – *Plant Dis. Reptr*, xxvii, 22, pp. 594–601, 1943. [Mimeographed.]

A tabulated account is given of a series of 30 vegetable seed-treatment tests conducted at the Western Washington Experiment Station in 1943 with a number of up-to-date fungicides intended to serve as substitutes for the standard copper and mercury compounds in an eventual war emergency. The most consistently effective preparations were arasan, spergon, 2 per cent. ceresan, and semesan.

Spergon (1·5 per cent.), for instance, increased the average lettuce stand from 20 to 78 per cent., while ceresan at 1 per cent. raised that of spinach from 17·8 to 78·4. Fermate gave promising results in several trials, but its range is more limited than that of the chemically nearly related arasan. The latter and ceresan were uniformly beneficial to beet, spinach, and Swiss chard [*Beta vulgaris* var. *cicla*], while the use of spergon and ceresan insured satisfactory stands of legumes (peas, beans, and Lima beans [*Phaseolus lunatus*]). In general, small seeds responded most favourably to high (1·5 or 2 per cent.) or medium (0·75 or 1) concentrations, while larger ones were not materially affected by this factor, except in the case of ceresan, which was toxic to maize, peas, and beans, especially the last-named, at 2 per cent. but not at lower dosages.

Afanasiev (M. M.), & Morris (H. E.). **Diseases of Sugar Beets in crop rotations at the Huntley Branch Station, Huntley, Montana, from 1936 to 1941.**—*Bull. Mont. agric. Exp. Sta.* 419, 23 pp., 3 figs., 1943. [Abs. in *Exp. Sta. Rec.*, xci, 2, pp. 166–167, 1944.]

Seedling sugar beet diseases were rife from 1936 to 1941 in 18 out of 20 unmanured rotations under observation since 1912 or 1916, whereas manured successional crops were relatively healthy. Beets in those plots of the unmanured series in which lucerne figured for several years suffered considerable damage from phosphorus deficiency, which was virtually absent in the manured crops. Yellows occurred in the one-, two-, and three-year rotations but was barely noticeable in those of four or six years. Nitrogen deficiency was invariably present at midsummer in the unmanured annual to triennial rotations. The prevalence of seedling diseases and phosphorus deficiency in the unmanured rotations points to soil depletion as the predominating factor in the pathological developments investigated.

Hutton (E. M.). **The field emergence and yield of garden Peas as affected by treatment of the seed with fungicidal dusts.**—*J. Coun. sci. industr. Res. Aust.*, xvii, 2, pp. 71–74, 1944.

Owing to the prevalence of pre-emergence damping-off of peas in Australia, seeding rates of 3 to 4 bush. per acre are often necessary to obtain a satisfactory stand. In an experiment conducted in two localities, with poor and good soil, respectively, on the former, the field emergence of William Massey seed treated with spergon, ceresan, and cuprox (2 oz. per bush.) was, respectively, 65·04, 49·06, and 52·01 per cent., as compared with 44·87 for the untreated control, whereas on the latter the corresponding figures were 76·37, 66·88, 62·59, and 64·19 per cent., respectively; with Greenfeast seed the figures on the poor soil were 78·75, 66·96, 76·83, and 64·73, and on the good soil, 87·19, 83·16, 83·53, and 83·09 per cent., respectively.

In a second experiment, 50 samples of seed from different parts of Australia and New Zealand were treated with spergon only, and three sowings made at monthly intervals beginning towards the end of October. The data obtained showed that the mean percentage field emergence varied from one planting to the next, the tendency being towards a poorer emergence as the season advanced from cool spring to hot summer. The difference between the dusted and undusted seed did not vary significantly from one sowing to the next, and ranged from 8·55 to 13·42 per cent.

The results showed that the field emergence of the poorer seed was improved by spergon to a point where it approached that of good seed, but the best seed was not benefited by spergon dusting to any marked degree. On the average, the William Massey samples were much poorer than the Greenfeast; with the former, the dusted and undusted samples gave, respectively, 69·32 and 53·1 mean per-

centage field emergence, as against 88·04 and 83·29 per cent., respectively, for Greenfeast.

None of the dust treatments significantly increased yields.

McNew (G. L.). **Which varieties of Peas need treatment? Pea seed treatments as crop insurance.**—*Canner*, xcviii, 19, pp. 14, 16, 26, 28, 30; 20, pp. 20–22, 46, 48, 50, 5 figs., 1944.

The conclusions reached in the 1940 field trials of pea seed treatments in respect of spergon, semesan, red cuprocide, 2 per cent. ceresan, and new improved ceresan have been substantiated by further tests during the past two seasons and therefore still stand. They showed that spergon [*R.A.M.*, xxii, p. 338 *et passim*] consistently produced the heaviest yield increases in the Surprise, Green Admiral, and Pride varieties. Red cuprocide and ceresan were also generally effective as seed protectants, semesan gave excellent results but proved somewhat costly, while new improved ceresan had to be excluded from further consideration on account of its adverse influence on growth and yield in some fields. Very promising results have also been obtained with two new preparations, arasan and fermate, used at dosages of 1 and 2½ oz. per bush., respectively. In one test at Geneva, New York, spergon (1½ and ¾ oz. per bush.) and fermate raised the percentage of emergence from 66 for the untreated rows to 82, 81, and 81, respectively, the average yield increases for the lower dosage of spergon and for fermate being 832 and 703 lb. per acre, respectively. In 1941 and 1942, yellow cuprocide (1 oz. per bush.), spergon (2 oz.), 2 per cent. ceresan (2½ oz.), and red cuprocide (2½ oz.) were tested on a number of commercial varieties, the emergence of which (average of all) was raised in the former year from 61 to 72, 79, 73, and 74 per cent., respectively, and in the latter from 77 to 78, 85, and 81 for yellow cuprocide, spergon, and red cuprocide, the figure for ceresan being the same as the control.

In 1942, the emergence of untreated strains 243 and 256 of Surprise and 209, 242, and 255 of Perfection in steamed soil ranged from 95 to 99 per cent., compared with 1 (Perfection 255) to 67 per cent. (Perfection 242) in soil inoculated with *Pythium ultimum*; for seed treated with spergon (2 oz.) the corresponding range was from 49 (Perfection 255) to 93 per cent. (Surprise 256). In a series of tests in chambers at different soil temperatures, seed decay was more severe on both varieties at the lower range (58° to 67° F.) than at the higher (84° to 90°), while the reduction in yield at the former amounted to 57 and at 90° to 12·17 per cent.: up to 84° the disease was quite prevalent, so it may be assumed that field temperatures will seldom be sufficiently high to promote escape from infection. Seed treatment reduced the 57 per cent. loss in the low temperature series to 14 per cent. and eliminated that incurred at the higher range. A temperature of 76° may be regarded as the optimum for seed germination and plant growth. In two tests to determine the effect of soil moisture on the virulence of seed decay by *P. ultimum*, the percentage of emergence of Superlaska ranged from 6 to 11 in very wet to 91 and 92 in slightly dry soil, the corresponding figures for Laxton, Surprise, Perfection, and Pride being 0 under the former and 77 and 83, 82 and 88, 76 and 85, and 68 and 73, respectively, under the latter conditions. About 3 per cent. more soil moisture was required to produce a given amount of decay in Superlaska than in the other varieties, representing two or three extra disease-free days for germination while the hyphae of the fungus, which grow at the rate of 1½ to 2 in. a day, penetrate and destroy the seeds of the sweet varieties.

Pea seed treatment pays for itself if it fulfils any one of the three following requirements: (1) saves over 3½ per cent. of the seed from decay, (2) increases the yield by 20 lb. per acre, or (3) prevents complete failure of the stand in one field out of fifty.

Burkholder (W. H.). **Xanthomonas phaseoli var. fuscans on Beans in New York State.**—*Plant Dis. Reptr*, xxviii, 15, pp. 496–497, 1944. [Mimeographed.]

Examination of diseased Michelite bean seeds from six different fields in New York showed the presence of smooth, glassy, yellow spots, often covering the entire surface. Dilution plates were made with nine seeds, and in eight the only organism found was *Xanthomonas phaseoli* var. *fuscans*. This organism, hitherto considered to be comparatively rare, was reported by the author in 1930 as having been found in Switzerland in 1924 and 1927 [*R.A.M.*, ix, p. 695]; it was later isolated by Miss F. Hedges from bean seed from South America, and in 1937 it was found by R. D. Wilson in Wisconsin; it has also been reported from Russia [ibid., xix, p. 383].

Raphael (T. D.) & White (N. H.). **Varietal resistance to halo blight in Beans.**—*J. Aust. Inst. agric. Sci.*, x, 2, pp. 76–77, 1944.

In a small-scale bean variety trial in Tasmania, it was noted, following a natural infection by *Pseudomonas medicaginis* var. *phaseolicola*, that Little Mary Bean, Hawkesbury Wonder, Clarendon Wonder, and Light Blue Lake showed no infection, Staley's Surprise, New Discovery, Granada, and Black Wonder showed mild to moderate infection, and Burpee's Stringless, Tweed Wonder, Wellington Wonder, Canadian Wonder, Brown Beauty, and Refugee severe infection. There appeared to be a fairly even distribution of inoculum, so that the reactions of the varieties can be taken as a good indication of their resistance to this disease under Tasmanian conditions.

Tims (E. C.). **Further observations on white rot of Allium in Louisiana.**—*Plant Dis. Reptr*, xxvii, 15, pp. 280–281, 1943. [Mimeographed.]

Sclerotium cepivorum, first reported on garlic, shallot, and onion in Louisiana in 1942, has now spread into adjacent localities. Most of the infected areas, however, are scattered and the heavily diseased portions of the fields are comparatively small, ranging from two to three acres in extent. Preliminary tests showed that the fungus grows very poorly on certain liquid culture media at P_H over 7. The P_H value of several soil samples from affected fields ranged from 5·5 to 6·6. The reaction of the surrounding healthy areas was not appreciably different. No infection was found in fields with P_H not below 7.

Observations showed that under favourable conditions shallot plants in the field can be killed by the disease in 22 days. Wild onion (*Allium canadensis*) was found affected for the first time, the symptoms being similar to those on shallot or garlic except that in most cases the plants were not completely killed. Wild onion plants placed in pots and inoculated with macerated, severely affected shallot plants developed typical symptoms and died in a few weeks. The presence of the disease on wild onion suggests how difficult it may be to eradicate it, even though susceptible hosts are not cultivated for many years.

Modifications of regulations governing the importation of Potatoes into the United States. Amendment No. 6 to the regulations governing the importation of Potatoes into the United States.—U.S.D.A., B.E.P.Q., 1 p., 1944.

The purpose of the present amendment, effective as from 15th April, 1944, to the regulations governing the importation of potatoes into the United States [cf. *R.A.M.*, xvi, p. 352], is to add the State of Tamaulipas to the list of Mexican States enumerated in Amendment No. 5 (comprising Chiapas, Guanajuato, Jalisco, Queretaro, San Luis Potosi, and Sonora) whence entry is permitted through certain designated ports.

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